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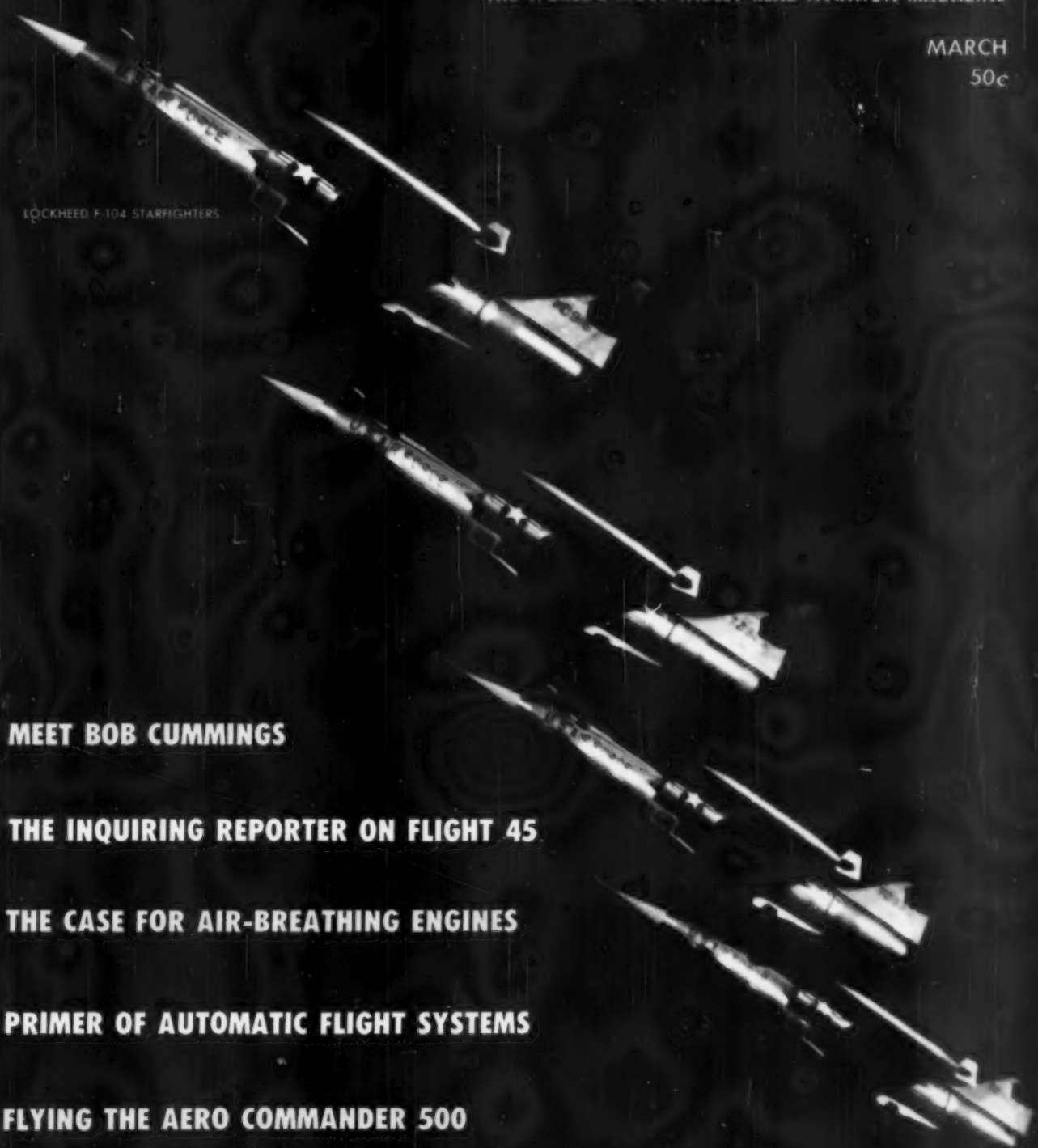

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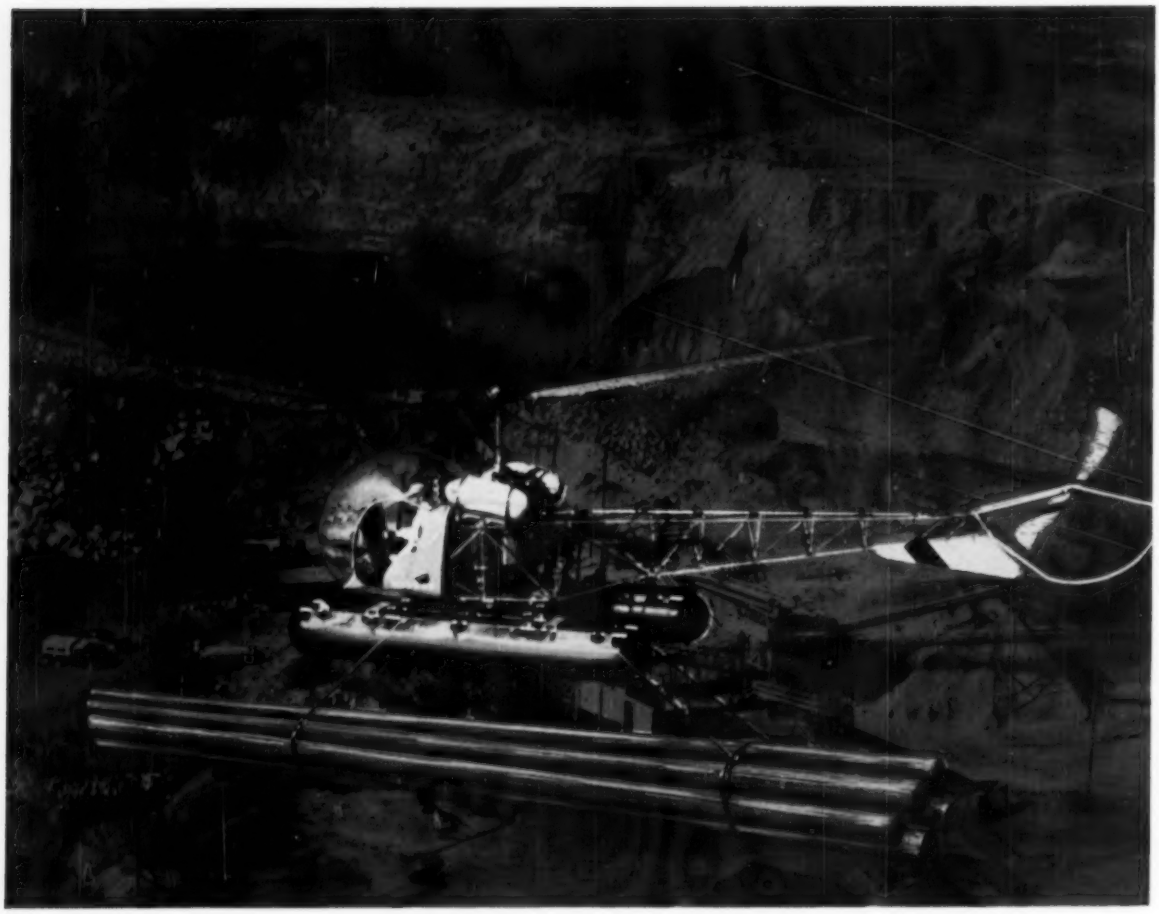

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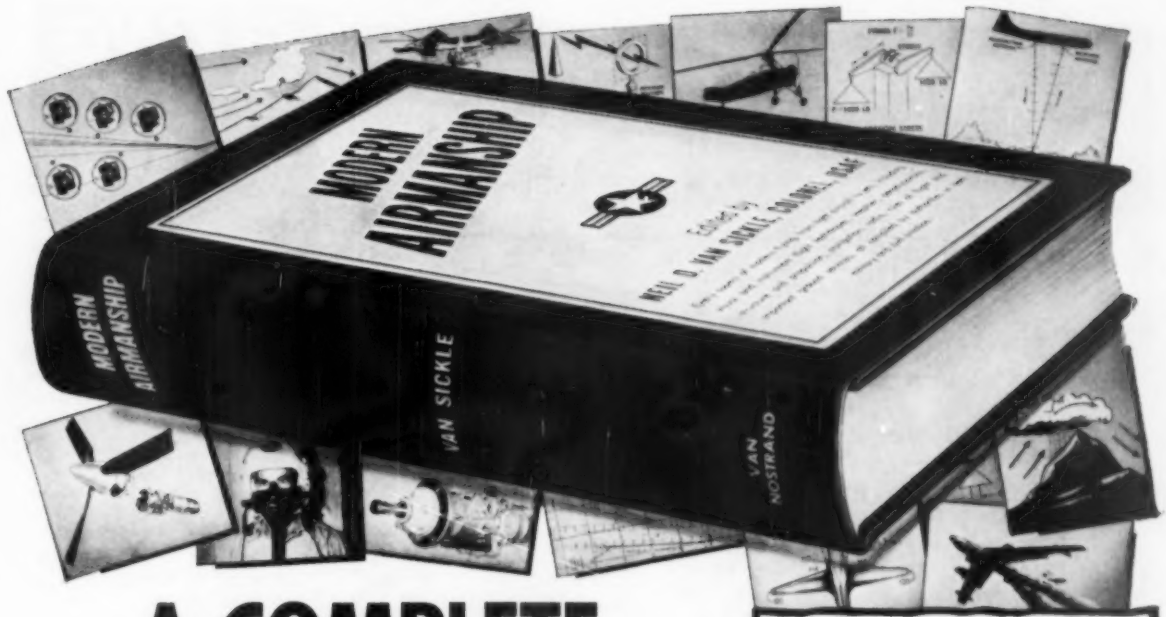

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THE COVER: Outstanding for speed and altitude records, Lockheed F-104 Starfighters such as these are on order for various NATO nations. Turn to page 24 for the first of a three-part profile on Lockheed.

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MAILBOX

AN INSTRUCTOR COMMENTS ON CAR-20

I would like to express my opinion on the new amendment to CAR part 20 which requires instrument demonstrations on both the private and commercial flight tests after March 15, 1960. I am presently an active commercial pilot, flight instructor and ground instructor at Hawthorne Airport (Calif.) in the Los Angeles area.

First of all, I heartily endorse the new regulation. It will undoubtedly work a small hardship on flight schools and students obtaining their certificates because training equipment must be upgraded, and the cost of obtaining a certificate is going to be higher. But the upgraded abilities should be worth the price.

Secondly, I feel that there are two deficiencies in the regulation change. If the new rule is to achieve its desired effect, an operating turn and bank indicator should be required in all airplanes. The ability to control an airplane on instruments is worthless without gyro instrumentation. Also, a commercial pilot who has the privilege of charging remuneration for his services as a pilot, should be classed as a professional in the full sense of the word. I feel it is not asking too much of any professional pilot to be capable of handling his airplane as well by visual reference inside the cockpit as by visual reference outside; to navigate as well by radio as contact, to be able to handle communications in a professional manner. In short, to be a full instrument pilot. I further feel that the commercial requirements should include the full 40 hour minimum instrument training period . . . that the commercial flight test include the full instrument test, with accompanying instrument privileges. Thus, the commercial certificate would stand further apart from the private instead of, as now, being mostly a recognition of additional hours of flight time.

PETER E. BORON

Hawthorne, Calif.

NEW AIRCRAFT COLOR SCHEMES

I, for one, would like to voice some strong disapproval over some of the color schemes on many of our newer aircraft. Considering the fact that the "see-and-be-seen" concept is still our major means of keeping VFR traffic separated, there are too many aircraft with paint jobs which render them almost invisible, making an already tough job of staying clear of congested patterns even more difficult. The Cessna 210 on your December cover is a perfect example. It couldn't blend in much better with the background if it were camouflaged a la WWII Spitfire. Cessna is certainly not the only offender; aircraft with color schemes which break up the outlines of the plane and blend in with the background seem to be the trend, fluorescent paint, notwithstanding.

. . . Let's keep away from quilted patterns and camouflage colors which make aircraft so hard to spot. Flying in this smoggy ol' Los Angeles basin can get hairy enough without the additional danger of letting down on another aircraft which is almost invisible.

NORMAN EPPSTEIN

Downey, Calif.

WAS THERE SUCH A PLANE?

I thoroughly enjoyed the article "Of Men and Planes," by Donald Douglas, Sr., in a recent issue of your magazine. I've been interested in aviation since an early age, probably helped by my father's being with Eastern Airlines for 23 years, where he started as a steward on the DC-2. I have followed the histories and episodes of the Douglas aircraft from the

DC-1 to the proposed DC-9, but I never recollect hearing about a DC-5. Was there such a plane?

DONALD S. LLOYD

Duke University
Durham, N. C.

● *There was indeed. (see cut) A tricycle-geared 16-passenger transport, powered by two 900-hp Wright Cyclone engines, the DC-5 was built at the El Segundo (Calif.) Division of Douglas in 1938-39. The U. S. Marine Corps used a number of these planes under the designation R3D-2 as paratrooper aircraft and the Dutch airlines KNILM used several as transports in the Dutch East Indies.*—ED.

THE NORTHROP STORY

We want to thank you most sincerely for the excellent story in January issue of FLYING on the Northrop Institute of Technology. We are delighted with the story in every way and feel that it will not only be beneficial to us, but that it will also be a very interesting story to readers.

HERBERT W. HARTLEY, Vice President
Northrop Institute of Technology
Inglewood, Calif.

USED PLANE FINANCING

Why is it that you can buy a big fancy automobile with nothing, or darn little, down and take three years to pay for it, but a guy with three or four hundred dollars can't finance a $1,000 used plane to save his soul?

It seems that to finance a used plane it has to be way up in the thousands of dollars and then you need three-quarters

(Continued on page 8)

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- **Quietest light twin in the sky.** Even at 200 mph, the Travel Air's super-soundproofing lets you cruise in relaxing "Quiet Sealed" comfort no other twin can match.
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- **Extra-long range** lets you fly up to 1,410 miles non-stop.
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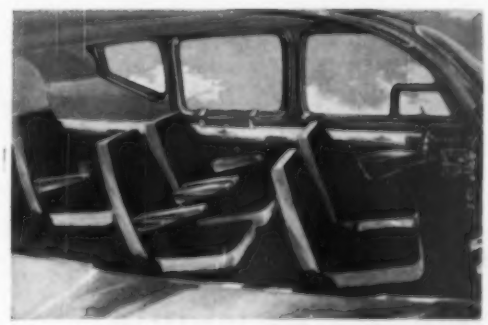
- **New comfort control system** keeps you warm in winter, cool in summer—automatically—wherever you fly.

See your Beechcraft distributor or dealer now. Or, for illustrated Travel Air brochure and free copy of "Dollars and Sense of Business Flying," write Public Relations Department, Beech Aircraft Corporation, Wichita 1, Kansas, U. S. A.



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Cross Reference to page 81

MAILBOX

(Continued from page 6)

down and umpteen hundred a month for the balance.

Isn't there any place where a man of modest means can buy a little old Cub or T-craft for about $300 down and $35 or $40 a month?

JOHN J. HOLM

Cranbury, N. J.

● *Sympathetic though we may be, we must confess to not having the answer. Maybe some of our readers do?*—ED

WW II 8th AAF DATA

Many of your readers must be ex-8th AAF personnel and will have memories, happy and otherwise, of their days in England. My ambition is to get enough material to write a book on the "8th" and wonder, since your magazine is the world's most widely read aviation monthly, if you could help me with my research.

I would be grateful to anyone who could write to me and perhaps quote some of their memories, serial numbers, code letters, nicknames of various planes, names of crew members, date of missions, medal awards, and, indeed, anything at all to do with the outfit would be of the greatest interest. Photographs too would be appreciated and any loaned to me would be treated very carefully and returned to their owners.

I will be most appreciative of any assistance.

H. HOLMES

8 Coleridge Ave.,
Middleton, Manchester, England

BELLANCA 260

We wish to express our sincerest appreciation to your magazine for the cover page on the Bellanca 260 and to Ted Durosko, as well, for the very fine article (Check Pilot Report) which appears in the January issue. It is our desire to secure reprints in quantity for use in our sales promotion.

O. J. MILLER, Vice President—Sales
Downer Aircraft Industries
Alexandria, Minn.

APPROBATION

Thanks for "Main Street" Airlines in the December issue of FLYING. Even though I am in the business, I found it was both interesting and authentic.

LESLIE O. BARNES, President
Allegheny Airlines, Inc.,
Washington, D. C.

HERE'S WHY I FLY

Thanks to Harry Williams for writing "Here's Why I Fly" (November issue) . . . for me.

J. J. BONNER

Lubbock, Tex.

. . . One of the most stimulating and thrilling I have ever read. I feel confident that so long as private aviation is around, there will be many of us who share Mr. Williams' feelings.

JOHN BLANCHARD

Santa Paula, Calif.

BRING BACK THE FUN

For those seriously desiring to "bring back the fun of it," there is a suggestion that goes to the heart of it . . . Fly sailplanes—really fly—and leave the stupid engines on the ground. Soaring is a delightful form of flight that has yet to be prostituted by military and business interests.

I personally hope that it will remain completely useless, unprofitable, and fun.

EMERSON FORD

Durham, N. C.

● *Fun, indeed. Nonprofitable, true, (but neither is powered flight for pure sport profitable). Useless, we disagree. Flying gliders gives a vastly better feel of the aircraft than possible in flying powered planes. Also, soaring teaches correct interpretation of weather, therefore the soaring pilot bows to no other pilot in this department.*—ED.

HOME-BUILT AIRCRAFT

I have been a reader of FLYING for years and thoroughly enjoy the magazine. However, I would enjoy seeing more articles on home-built aircraft and aviation on the private level. Enclosed is a picture of my own home-built which was completed in about 18 months in my double garage, and test-flown by me in June 1959. It now has about 100 hours on it.

My ship was constructed around modified plans of the Cougar and Tailwind type of aircraft. It is a two-place model with 20-foot wing span and has full electrical system with radio VHF. Powered by a 100 hp Lycoming engine, it cruises at over 140 mph. In August I flew it to the Experimental Aircraft Association fly-in at Rockford, Ill., where it received an award for outstanding workmanship.

VAN WHITE

Lubbock, Tex.

THE AIRMAN'S WORLD

I have just laid aside my copy of your book, "The Airman's World" at the conclusion of my first reading of this magnificent opus. I have the feeling that I'll be repeatedly drawn to its pages, and shall treasure it as one of the Truths In Aviation.

Please add my grace note to the symphony of praise which must be forthcoming from the readers of this book. It is graced by the gentle touch of genius from your pen, the force of profound guidance dipped from the fountain of the eternal.

KEITH WIESLEY

Civil Aeronautics Board
Washington, D. C.

● *A limited number of first edition copies of the Airman's World are still available, through Flying Book Service, 434 So. Wabash Ave., Chicago 5, Ill. $2.95 per copy.* —ED.

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Briefings . . .

TWO BOSTON-BASED American Airlines pilots were among the four aviation figures honored by the National Pilots Assoc. Dec. 17 at Wright Day dinner in New York. AA's Capt. Walter P. Moran (left) and First Officer James Garner were cited for diverting their DC-6B

from a scheduled flight to lead a lost student pilot to a safe landing in upstate New York. Also honored were Miss Jerrie Cobb, Oklahoma City, pilot-executive of Aero Design & Engineering Co., and Dr. August Raspet, head of the aerophysics department of Mississippi State University.

IN SEARCH OF any pattern, which might point to new safety measures, Flight Safety Foundation of New York is digging into the records of all aircraft approach and landing accidents since 1946. The study, originally proposed and backed with a large initial contribution of funds by American Airlines, is under the direction of Dr. Otto E. Kirchner, noted aeronautical scientist, on leave from Boeing.

BY THE CLOSE OF 1959, the Air Transport Association reports, almost 300 turbine-powered air transports were being operated by U. S. airlines. Of this number, as of Nov. 1, ATA says, domestic airlines were operating 68 pure jets and 214 turbo-props. Current orders, with delivery dates through 1962, include 232 pure jets and 81 turbo-props. The estimated total cost for these aircraft and supporting ground equipment is placed at $2½ billion dollars. Excluding U. S. carriers, 73 world airlines have 450 turbine-powered planes in service; with an additional 295 scheduled for delivery through 1963.

NON-PROFESSIONAL PILOTS came in for a pat on the back from FAA Administrator Elwood R. Quesada during an address before the Society of Experimental Test Pilots in Beverly Hills, Calif. "In the field of private flying," General Quesada said, "we find the true pilot . . . be he the Sunday flyer . . . or the businessman who flies to increase his production. He represents the backbone of our aeronautical growth. . . . He believes so strongly in flying that he pays for his own plane and buys his own instruction." "However," the Administrator added "he, too, must accept new responsibilities. He, too, must become more safety conscious."

SQUEEZING FLYING LESSONS into a busy schedule, Ingemar Johansson (right) decided he needed an airplane to keep up with his schedule and has purchased a Cessna 175. Sale was made through an old friend, Thor Solberg, (left) Cessna

distributor for Norway and Sweden who also operates an airport at Readington, N. J. The world heavyweight champ paid a visit to Readington to get some flying time on his new purchase before the plane was shipped to his native Sweden.

NOTICE IS GIVEN by FAA to the effect that CAR Amendment CAR-60-14 which authorizes raising of the base of controlled airspace from 700 feet to 1,500 feet, has been postponed until July 1. Adopted by the Civil Aeronautics Board Dec. 29, 1958, this new ruling was originally to become effective Jan. 1, 1960.

PURCHASED BY the people of St. Louis, Mo., through a fund-raising campaign headed by the St. Louis Junior Chamber of Commerce, this Piper Apache is destined for service in Laos, Southeast Asia, with the famed missionary, Dr. Thomas

Dooley. Prior to take-off for Laos, under pilotage of Jerry Euster (left) and W/O Marvin W. Wingrove, U.S. Army, (2nd left) the plane was blessed by the Very Reverend Paul J. Reinert (center) president of St. Louis University in the presence of the doctor's mother, Mrs. Thomas Dooley (extreme right), and others.

ALASKA "the flyingest State in the Union" is compiling a new 400-page airport directory to be sold for $5. The cost covers the basic book, plus a three-year subscription to revisions and additions. Copies may be obtained from the Division of Aviation, Anchorage.

A MILLION DOLLAR GRANT to Omaha's municipal Airport from the Eugene C. Eppley Foundation was jointly announced recently by Arthur C. Storz, Jr., Airport Authority chairman and Lloyd Prince of the Foundation. To be matched with state and federal funds, this unique grant from a charity organization is to be utilized to improve lighting, taxiways and "runways" according to Mr. Stolz, "long enough to permit landing and take-off of today's largest jet aircraft." Head of a

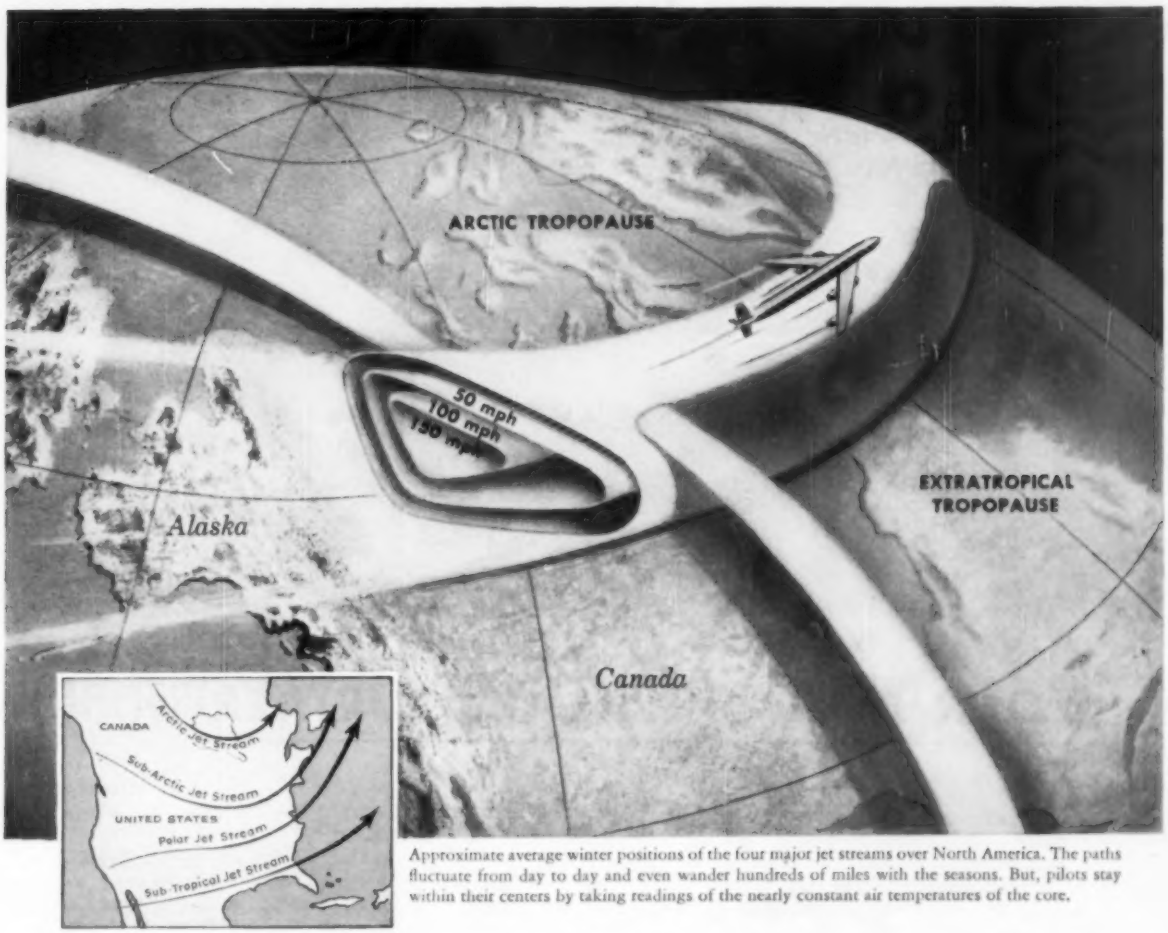
(Continued on page 14)

SHINN ENGINEERING, INC., Santa Ana, Calif., manufacturer of aircraft and missile components, has acquired manufacturing rights and sales license for the Morrisey 2150, a two-place, all-metal, 150-hp Lycoming-powered utility aircraft. Key personnel of the Morrisey company, including its president, William J. Morrisey, have joined Shinn Engineering to speed a production schedule calling for ten aircraft per month by April 1960. A new $20,000 building is being constructed to manufacture the Morrisey, flyaway price for which is $8,245, Santa Ana.

Mobil — FLY WEATHER-WISE

JET STREAMS...

High Velocity Winds Speed Long-Range Jet Flights



Approximate average winter positions of the four major jet streams over North America. The paths fluctuate from day to day and even wander hundreds of miles with the seasons. But, pilots stay within their centers by taking readings of the nearly constant air temperatures of the core.

TODAY, jets can boost their ground speeds upwards of 150 miles an hour with the help of the jet streams—giant rivers of westerly winds, flowing at hurricane speeds, 2 to 8 miles above the Northern and Southern Hemispheres.

Jet streams are basically a result of the marked temperature variations existing between the tropical, extra-tropical and polar tropopauses, and are usually found coursing along the broad areas where one tropopause overlaps another. Shaped much like a flattened tube, the streams are from 100 to 300 miles in width and from 2 to 5 miles deep. Wind speeds at the core are generally about 150 mph (though much greater velocities have been recorded) and diminish outward from the center.

* * *

No matter what the aircraft, or what the flight plan—jet from Los Angeles to London, or small private plane from Cleveland to Toledo—Mobil has the perfect, top-quality product for every Aviation need! So, remember . . . Fly Weather-Wise! . . . Fly Mobil!

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1960 Tri-Pacer

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You get more performance, more utility, more zip, more sheer fun of flying—and more profit, too! for less money—with either the Piper Tri-Pacer or the Caribbean.

For only $8795—less than $248 a month—you can buy and fly your own Caribbean with over 130 mph cruise, big comfortable cabin for four people. Flies faster, costs less than any other competitive four-place plane available. Actually costs little more than other two-place aircraft.

For just a little more, yours can be the sensational new 1960 Tri-Pacer that cruises 138 mph with new optional wheel fairings which add speed and beauty.

Many new refinements and design improvements are yours in either the 1960 Caribbean or Tri-Pacer, plus cabin styling and beauty which will make your passengers exclaim in admiration.

See your Piper dealer and be sure to fly the new 1960 Caribbean or Tri-Pacer. They'll take you faster than any other planes in their class—and your money will go further.

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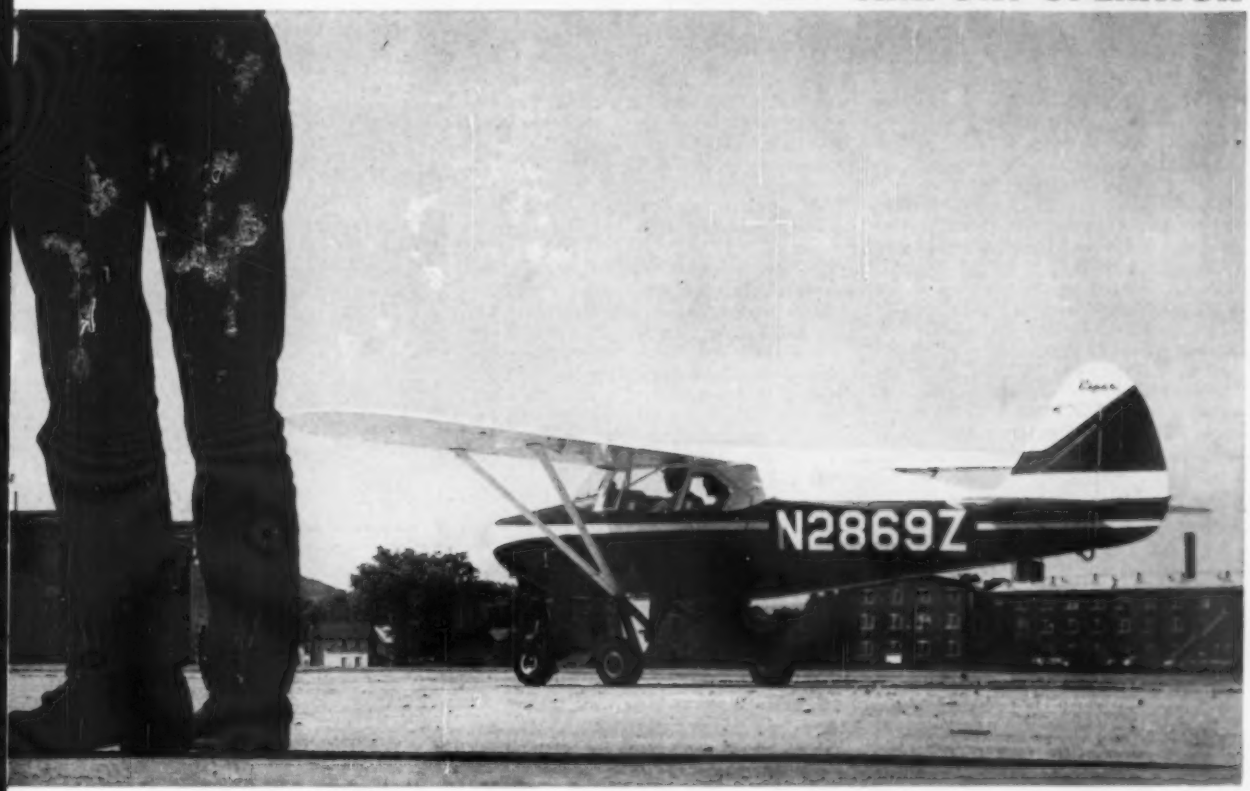
Simplified inter-connected controls coordinate rudder and aileron automatically... Large rear door for loading freight... Large outside baggage door for easy luggage loading... Lycoming power—smooth, reliable, four-cylinder design for better dependability, lower maintenance costs... Hydrosorb tricycle landing gear... *Duraclad finish* for beauty, durability... Simple, single hand brake equally accessible to both front seat occupants.

USED PLANE OWNER **AIRPORT OPERATOR**



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NOW'S THE TIME TO TRADE

If you now own a used airplane, why not trade up to a new, modern Caribbean or Tri-Pacer? More than likely your present airplane will more than cover the low initial payment.

Then you'll be able to enjoy all the increased utility of a four-place plane with real cross-country performance. You'll be surprised, too, at how much less expensive you will find it to operate and maintain a brand new airplane.

Here's how easy and economical it is for you to acquire a brand new four-place airplane, using the Caribbean as an example:

IF THE TRADE-IN VALUE OF YOUR AIRPLANE IS:	YOUR MONTHLY PAYMENTS WOULD BE:
$2500	$237.74
$3500	$205.79
$4500	$173.85
$5500	$141.90
$6500	$109.96

Or, if you wish, you can arrange a capital-conserving lease deal.

1960 Caribbean

Conceived especially for flying clubs, airport operators, private owners, the Caribbean is available in two models—Standard and Custom. Powered with a 150 hp Lycoming, it can be flown as a trainer using as little as six gallons per hour. Doubles as an economical air taxi plane. Special lease arrangement offered operators. No capital tied up, small monthly lease payment. Ask your Piper distributor for details.

SEE YOUR PIPER DEALER

for more information on the great new 1960 Tri-Pacer and Caribbean and trade-in details. Or write for brochures: Piper Aircraft Corporation, Lock Haven, Pa., Dept. 3-G.

MORE PEOPLE HAVE BOUGHT PIPERS THAN ANY OTHER PLANE IN THE WORLD

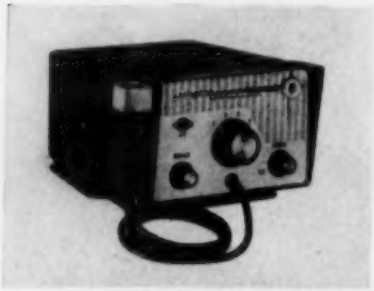
PIPER AIRCRAFT CORPORATION
LOCK HAVEN, PENNSYLVANIA

Briefings . . .

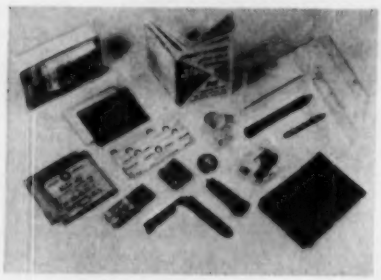
(Continued from page 10)

vast chain of hotels, the late Mr. Eppley harbored a lifelong interest in aviation, having learned to fly in 1909. He was a founder of NAA and, at his death, a director of Mid Continent Airlines and Braniff International. By unanimous vote, the Airport Authority has recommended the name of Omaha Municipal be changed to Eppley Airport.

MULTI-CHANNEL two-way radio for 11-meter Citizen Band service is a new product of the Gonset Division of Young Spring & Wire Corp., 801 So. Main St., Burbank, Calif. Called the G-12, the unit operates within the 26.965 to 27.235 megacycle Citizens Band recently assigned by the FCC for virtually unrestricted business or personal use. Transmitter, receiver and 12VDC/117VAC universal power supply are in compact unit, weighing but 11 pounds. Transmitter is rated at five watts power input. Complete with press-to-talk microphone and crystals for one channel, $149.95.



POCKET-SIZE, this compact, lightweight first aid and survival kit contains 17 separate items for emergency use and a 16-page instruction book. In waterproof plastic case, the contents include basic first aid items plus compass, knife, signal mirror, candle, pencil, paper, nylon leader, fish hooks, cloth and paper clips. Sells for $2. From Johnson-Weiler, Box 3033, Hampton Station, Milwaukee, 18, Wis.



W. F. SAUER, until recently with The Martin Company of Baltimore as director of administrative planning, has been elected president of Aircraft Radio Corp. of Boonton, N. J. He replaces William F. Cassedy, Jr. who has retired. A project engineering test pilot with the Air Force in WWII, Sauer holds degrees in mechanical engineering and industrial management from the Universities of Pittsburgh and Columbia. ARC, leading manufacturer of aircraft navigation and communication equipment, became a wholly-owned subsidiary of Cessna Aircraft in February, 1959.

TO PREVENT formation of mildew on fabric aircraft surfaces, Airtex Products, Morrisville, Pa., has developed a new product called "No-Mold," a fungicide formulation compatible with either nitrate or butyrate dope. It is mixed four ounces to the gallon of clear dope, for the first brushed coat, when recovering aircraft. According to the manufacturer, "No-Mold" will more than double the fabric life in damp climates.

K. V. BRUGH, JR., long active in the National Aviation Trades Association, was recently elected as its president to serve for the current year. From Greensboro, N. C., Mr. Brugh is head of Greensboro-High Point Air Service. NATA also named Robert E. Monroe executive director, to fill the vacancy created by the death of Charles A. Parker last April.

A NEW DUAL PURPOSE emergency signaling device is being marketed by the International Flare-Signal Div. of Kilgore, Inc., Westerville, Ohio. Hermetically sealed, the unit, called "Daynite," contains both orange smoke and red flare; the orange for daytime, the red for night emergencies. Coast Guard-approved, "Daynite" is also recommended by the manufacturer for aircraft emergency use as well as boats. Night visibility is said to be up to 33 miles, and the day smoke signal, 13 miles.

FLIGHT INSTRUCTOR," Charles A. Zweng's manual for prospective flight instructors is now available in its 12th revised edition. Published by Pan American Navigation Service, North Hollywood, Calif., this manual includes the standard methods of flight instruction, including maneuvers for primary and advanced training, and new typical examinations for FAA flight instructor rating. Priced at $5 at all aviation suppliers and dealers.

BUSINESS AVIATION AUTHORITY Norman G. Larson, president of the Norman Larson Co., Beechcraft distributor of Van Nuys, Calif. has been reappointed chairman of the California State Aeronautics Commission. Larson's business flying center at Van Nuys Municipal Airport is acclaimed by the aviation industry as one of the finest of its kind.

CAR IMPORTS OF DAYTON, INC., Dayton, Ohio, found a sure-fire way of attracting customers to their automobile show rooms by placing an airplane in with the automobiles—a "first" in this type of dual merchandising in the area.

According to F. H. Guenther, Car Imports' president, the aircraft proved to be a magnet. Readers will recognize the plane as the four-place Mooney Mark 20-A.

ON AND AFTER March 10, indiscriminate consumption of alcoholic beverages aboard U. S. airlines is to be curtailed. A new FAA ruling provides that no alcoholic beverages (including the passengers' private stock) may be consumed unless served by the air carrier, nor will such beverages be served to passengers who appear to be intoxicated. Airlines are expected to advise passengers of the new restrictions and make suitable reports to the Agency of violations.

PROTECTIVE GLASSES in which five rows of pinholes of specific sizes and spacings are placed in a plastic opaque material, for protection of the human eye, are now being offered by Sunset Glare Corp., (P.O. Box 1209) Palm Springs, Calif. Called "Stenopeic" Glare Guard Sun Glasses, these pin-hole spectacles are said to be particularly relaxing to eyes for both distant and near vision use and are especially effective when flying. Price is $18.50 per pair, plus tax.

WORTH LOOKING INTO by aircraft engine servicemen and do-it-yourselfers is Gabb Special Products Inc.'s precision timing tool, "Time-Rite," adaptable to all type aircraft engines by a simple interchange of pivot arms. The arm, inserted in spark plug hole of the timing cylinder, accurately determines Top Dead Center of piston and angular position of crank-

(Continued on page 98)

most for your ADF dollar

Complete system including rotatable loop $895.00

LEAR GONIO
Finest ADF antenna
system available.

MOST DEPENDABLE...MOST ACCURATE, SENSITIVE AND VERSATILE... SUPERIOR PERFORMANCE...LIGHTWEIGHT, POWERFUL & LOW COST.

Lear ADF-12 radio range—communication receiver—automatic direction finder flies in more private and executive aircraft than all other ADF's combined.

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SPECIAL AIRWAY MANUAL

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- New "easy to use" Jepco Avigation (radio navigation) Charts with *Finger-Tip Indexing.*
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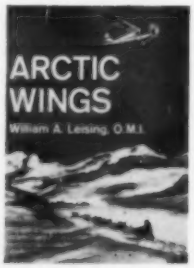
HAVE YOU READ?

By JAMES F. SUNDERMAN

ARCTIC WINGS, by William A. Leising, O.M.I. (Doubleday, $4.95).

An absorbing chronicle of Catholic Father William A. Leising, "The Flying Missionary" who covered the forbidden frozen wastelands of his Northwest Canadian Parish by air. For 40 years Father Leising served the Mackenzie River Missions, traveling first by foot and dog-sled, and later by airplane, to bring the comforts of medicine, religion, and humanism to Eskimo, Indian and White alike. His aerial exploits and adventures flying his Norseman and Aeronca, explore the soul and the mind of a courageous airman whose peace with God enabled him to face the adversities of arctic flying so that others might live more abundantly.



THE AEROPLANE PICTORIAL REVIEW (No. 4), compiled by the staff of *The Aeroplane and Astronautics* (Temple Press, London).

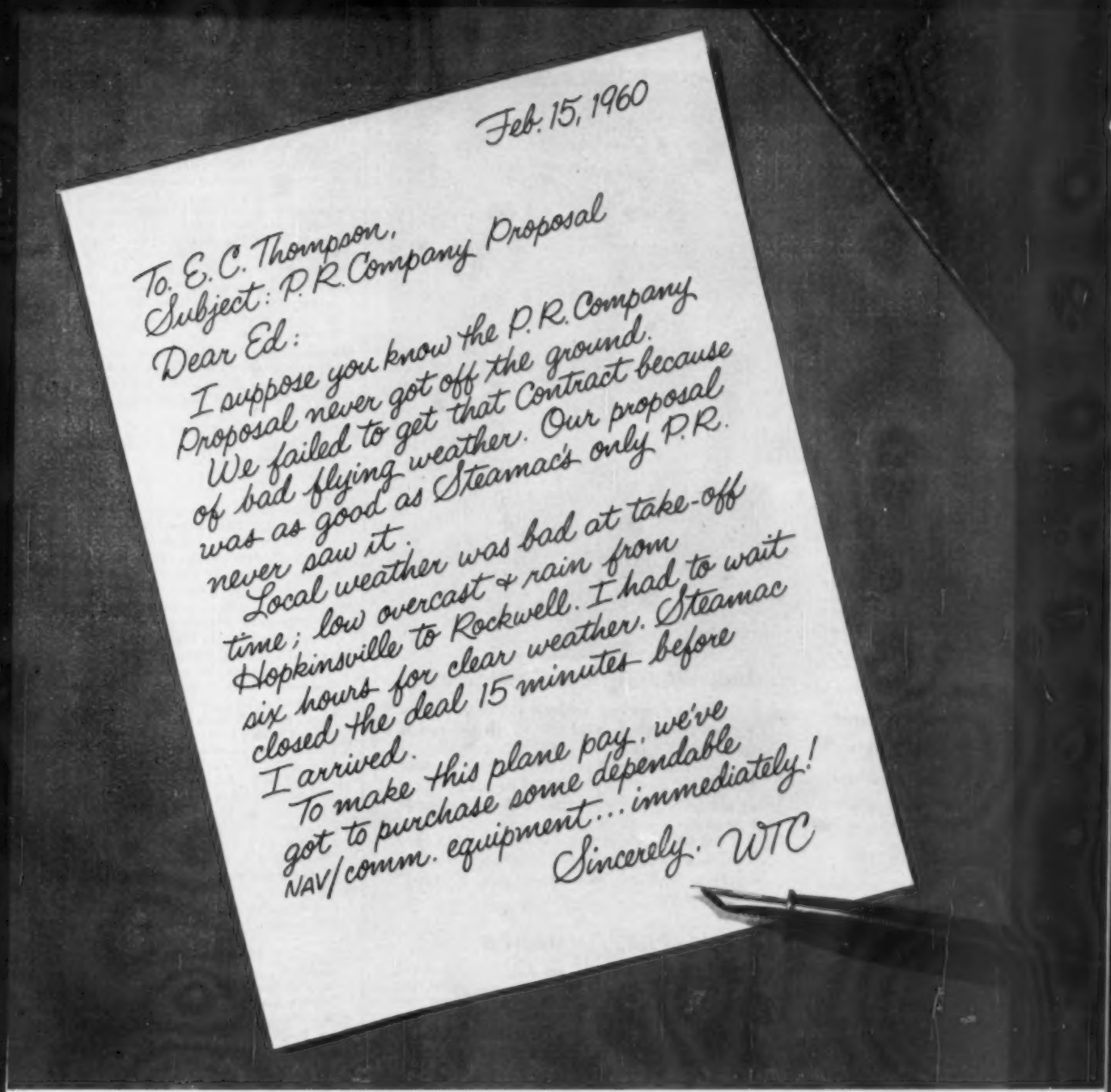
AIRCRAFT AND MISSILES, by D. M. Desoutter (John De Graff, $7.50).

These two British originals attract interest in America. The *Pictorial Review* uses picture-caption format to scan the 1959 crop of aircraft, helicopters, rockets and missiles. While some U. S. products appear, emphasis is on British hardware. International major air events like the Farnborough Show and the World Congress of Flight get recognition, and a chronology of the air year sums up annual progress.

Desoutter's Aircraft and Missiles is a readable, profusely illustrated text on the basic principles and scientific fundamentals underlying aircraft and missile theory, concept, design, construction, and flight from simple airfoils to supersonic jets and ballistic shapes. The broad coverage treats with infinite detail, and includes chapters on the atmosphere, sub-and-supersonic flight, propulsion and engines of all types, fuels, structures and materials, flight equipment, flight history, R & D, aerospace medicine. A rundown on aviation organizations and a glossary of air terms completes this utilitarian text and reference.

ILLUSTRATED GUIDE TO U. S. MISSILES AND ROCKETS, Stanley Ulanoff (Doubleday, $3.95).

An illustrated guide to 65 basic missiles and rockets of the Army, Navy and Air Force. Missiles are shown in photo and scale silhouette, with text describing their history, mission, guidance system and engine. Complete specifications of each appear in tabular form.


Feb. 15, 1960
To. E. C. Thompson,
Subject: P. R. Company Proposal
Dear Ed:
I suppose you know the P. R. Company Proposal never got off the ground. We failed to get that Contract because of bad flying weather. Our proposal was as good as Steamac's only P. R. never saw it.
Local weather was bad at take-off time; low overcast + rain from Hopkinsville to Rockwell. I had to wait six hours for clear weather. Steamac closed the deal 15 minutes before I arrived.
To make this plane pay, we've got to purchase some dependable NAV/comm. equipment... immediately!
Sincerely. WTC

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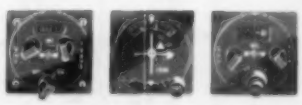
Business flying pays, but only when you can use your airplane. Make yours an all-weather airplane with Collins. Comm systems, $1520 and $2295 — nav/comm as low as $2495. Lightweight Collins equipment available for all aircraft, single engine to jet airliner. See your nearest Collins distributor, or write direct for literature on your specific needs.



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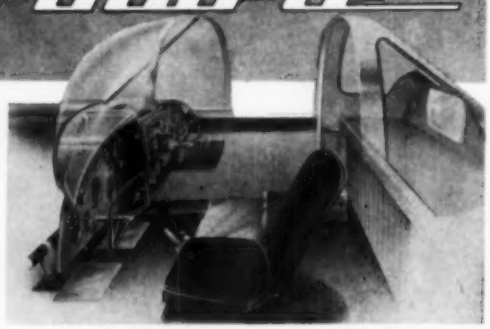

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Body-formed contour seats which are fully adjustable for individual operational attitude. The right-hand seat can be readily removed to allow stowage of additional cargo or baggage.

You will find the control of your choice in the 'sixty Fornaire. The famed Simplomatic co-ordinated control for simplified flying or conventional "stick n' rudder" maneuverability.

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ABSOLUTE CEILING	18,000 FEET
SERVICE CEILING	15,500 FEET
CRUISING SPEED, UP TO	125 MPH
STALLING SPEED	56 MPH TIAS
TAKE-OFF DISTANCE SL	500
LANDING ROLL SL	600

ECONOMY

MILES PER GALLON OF FUEL	22
COST PER AIRPLANE MILE	2.6c

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FLYING CALENDAR

Feb. 27—Antique Airplane Association first annual dinner dance at the Hotel Edison, New York City.

March 1-11, 1960—Third annual Flight to Mexico sponsored by Florida Aero Club. Starting vicinity of San Antonio (probably dude ranch), Monterrey, Guadalajara, Mexico City, Acapulco, return to Brownsville, Tex. Contact: Harry B. Collins, Air Cruise Director, 375 N.E. 154th St., North Miami Beach 62, Fla.

March 7, 8—Fifth Annual Business Aircraft Safety Seminar, sponsored by Flight Safety Foundation at the Dearborn Inn, Dearborn, Mich.

March 24-26—Fourth National Conference on Aviation Education at the Brown Palace Hotel, Denver, Col. Conference Comm. Ch., Dr. William Hinkley, Supt. of Schools, Aurora, Col.

April 2, 3—Private Aircraft Trade Fair at Ryan Airport, Baton Rouge, La. Free breakfast to pilots who fly in on April 2. Write: UHS Key Club, Univ. Sta., Baton Rouge 3, La.

May 1-4—Annual meetings and news conferences, Aviation Writers Association, Ambassador Hotel, Los Angeles, Calif.

May 1-5—Tenth All-Woman Air Race from Miami, Fla., to San Salvador, El Salvador. Sponsored by Fla. Ch. of the 99's.

May 11-14—Sixteenth National Forum of the American Helicopter Society at Sheraton Park Hotel, Washington, D. C.

May 13-15—Spring Sectional Convention of 99's hosted by Houston Chapter at Shamrock Hilton Hotel, Houston, Tex.

May 14—Sportsmen Pilots Handicap Air Race, from Air-Oasis Co., Long Beach Airport, Calif., to Las Vegas, Nev. Trophies, prizes. Contact: Thomas C. Buck, 13106 Galway St., Garden Grove, Calif. Phone: JEfferson 7-8635.

May 29—Aviation Day at Philadelphia International Airport sponsored by the City, the World Trade Week Committee and the Ch. of Commerce of Greater Philadelphia. Displays, demonstrations of planes and equipment.

June 3-4—Eleventh National Maintenance and Operations Meeting, Reading Aviation Service, Inc., Reading, Pa.

June 4-19—World Soaring Championship Contest, Butzweiler Aerodrome, Cologne, Germany. Sponsored by the German Aero Club. For information, write: Soaring Society of America, Box 66071, Los Angeles, Calif.

June 5—Michigan Flying Farmers' Dawn Patrol, Barstow Field, Midland, Mich.

June 5—Sixth annual C. R. Hoser Memorial Proficiency Flight from Hi-Line Field, (formerly Montgomeryville, Pa.) sponsored North Penn Squadron #904. Write: R. P. Goulet, 110 S. 4th St., Souderton, Pa., or call PArkway 3-9266.

June 14-16—Aviation Distributors and Manufacturers Assoc. 35th meeting at Queen Elizabeth Hotel, Montreal, Canada.

July 11-21—Flying Physicians jet cruise to Hawaii via 707 from Los Angeles and San Francisco.

Sept. 12-17—Second International Congress of the Aeronautical Sciences at Zurich, Switzerland.

Calendar items must be received at FLYING's editorial offices, 1 Park Avenue, New York 16, N. Y., three months prior to the event.

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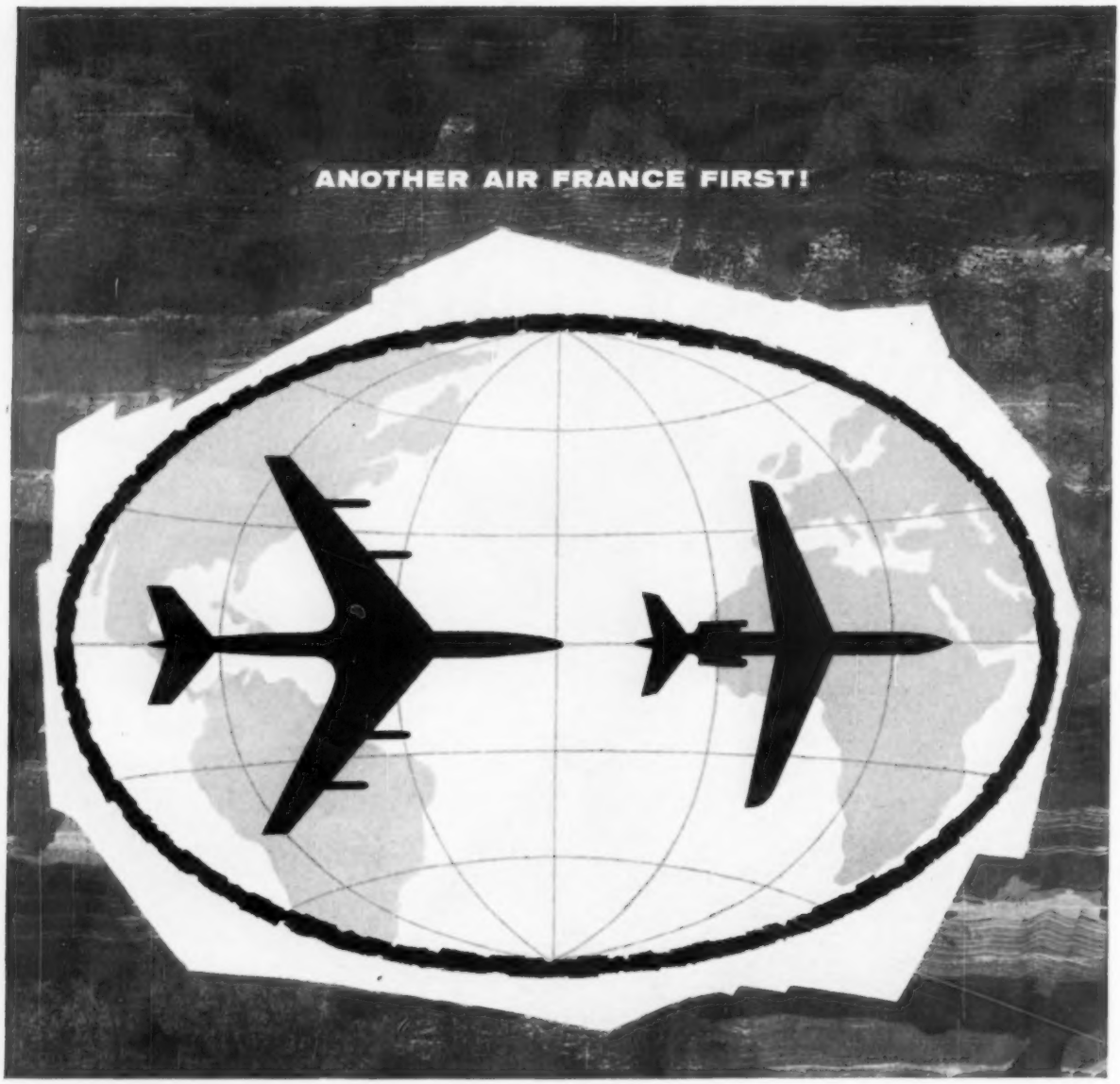

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Between the U.S.A. and Europe, Africa and the Middle East!

Never before has any single airline come so close to fulfilling the ultimate promise of the "Jet Age." Now a traveler can speed overseas to Europe by Air France 707 Intercontinental Jet and, without changing airlines, continue throughout Europe, Africa and the Middle East by swift Caravelle Jet. This is truly the finest, fastest, most convenient service of its kind—Jet to Jet service on Air France.

Exclusive "firsts" like Air France Jet to Jet service don't just happen; they have to be planned. Early in 1957, Air France laid the groundwork for this unique service by becoming the first airline to test and operate Caravelles in Europe. Then, when the first Air France Boeing 707 Intercontinental Jet touched down at Orly Field, a fleet of pure jet Caravelles was ready to inaugurate Jet to Jet service!

It is just this quality of leadership in planning that has helped Air France become the world's largest airline.

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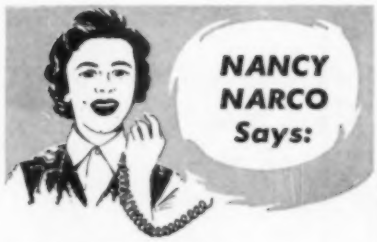

MULTIPLE RADIO

The person accustomed to operating with a lonely Superhomer, Omnigator or other single piece of radio equipment is understandably bewildered, temporarily, when he or she gets into an airplane which has two or more radios. Since the trend toward multiple radio installations is becoming increasingly prevalent, and since many owners are installing additional radio, it might help to understand how such a system should be set up and how the basic function switching operates.

Two Transmitters. **If you have two or more transmitters, it will obviously be necessary to have a switch to select the transmitter you want to use. Such a switch, a simple throw-over type, is usually marked "Transmitter #1" [or XMTR#1], and "Transmitter #2".**

Multiple Receivers. To select which receiver you wish to hear, the simplest arrangement is to use the volume control. Turn the volume up on the receiver you wish to listen to, turn the volume down on the one you don't want to hear.

A more sophisticated arrangement, however, is desirable to permit more rapid switching from one receiver to another. This is usually accomplished with a three-way switch for each receiver. Such a switch permits you to flip the audio of a receiver to any of three positions—cabin speaker, headset or stand-by. This has many advantages. For instance, you can set up one receiver for ground control, adjust the volume correctly, then put it on stand-by until needed after landing.

Or you may wish to listen to two different receivers simultaneously. You can have music coming out of the cabin speaker for the benefit of your passengers while you tend store with another receiver, for navigation or communications, using the headset.

The well-installed multiple-radio system groups all audio and transmitter function switches in a single console convenient to the pilot. This would involve a three-way switch for each receiver—speaker, headset and stand-by and a transmitter function switch. To simplify such installations, incidentally, Narco has developed the VP-9 Switchmaster, embodying all these function switches in a single, compact console.

When you first operate with a multiple radio system, it's pretty easy to get mixed up—such as transmitting on the wrong transmitter or not being able to hear because your receiver is on stand-by. A good mental check-list is FAT. F-for frequency. Make sure your transmitter *and receiver* are on the right frequency. A-for audio. Make sure the receiver you plan to listen on is not on stand-by. T-for transmitter. Make sure you have your transmitter switch on the proper transmitter.

Regards

Nancy

NARCO • Fort Washington, Pa.

NARCO SCORES AGAIN!

with a

190-CHANNEL CRYSTAL-CONTROLLED
VOR/ILS LOCALIZER INDICATOR
VHF COMMUNICATIONS RECEIVER

NEW *narco* MARK VI

Here's the answer to the need for an independent VOR/ILS localizer receiver/indicator—the Narco Mark VI. Gives you the convenience of fast, positive crystal-controlled tuning to all NAV/COMM frequencies between 108 and 126.9 megacycles. Lets you add a second Omni with minimum space and cost, without tying up your communications radio.

Weighs just 6½ pounds and requires only 3" by 6¼" panel space; completely self-contained, no separate power supply needed. Same size as the popular Narco Mark V, same fine crystal-tuning feature, exceptional accuracy, completely dependable for IFR operations.

MAKES POSSIBLE THE "ULTIMATE IFR SYSTEM" FOR LIGHT TWINS AND SINGLE-ENGINE AIRPLANES AT PRACTICAL COST

The Mark VI with two Narco Mark V's—one with Omni attached—gives you a complete "2½ System" for complete navigation and communications service.

- **Mark VI** for primary navigation always available for VOR or ILS.
- **Mark V** with VOR/ILS attachment—provides second Omni plus all-channel crystal-controlled communications.
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OR BUILD UP YOUR SYSTEM

Replace your older, limited-channel, tunable-receiver NAV/COMM equipment with a Mark VI for VOR/ILS navigation and a Mark V for all-channel communications. Add other equipment later.

See your Narco distributor or write for new Mark VI brochure

narco

NATIONAL AERONAUTICAL CORP., FORT WASHINGTON, PA.

. . . line upon line . . .
. . . precept upon precept . . .

GILL ROBB WILSON
Publisher

THE INTONATION of his prayer remains clear in memory after more than half a century—"Lord, grant us wisdom rightly to divide the word of truth, line upon line, precept upon precept, here a little and there a little."

Doctor James Fair, associate headmaster, whom we boys for some forgotten reason called Dan Boone, always ended morning chapel with the exact self-same phraseology, "Lord, grant us wisdom. . . ." And sotto voce we would accompany him to the familiar peroration, "here a little and there a little."

I'm sure that whatever Divinity listens to the prayers of wise men given added thrust by the gustiness of exuberant youth, must have smiled at the supplication in high blower from the banks of the Kiskiminetas—knowing we would eventually be trapped in memory of the words long after school days had dimmed in detail.

And so it has proven. Through the years it has seemed unforgettable that wisdom rightly to divide the elements of truth, patiently, courageously, tenaciously, is a flight plan that commends itself in any cockpit.

It is no news to any thoughtful person that this is a dangerous world in which to live, vulnerable to atomic bombs and intercontinental hydrogen-head missiles but even more vulnerable to intellectual indifference, irresponsible argument and selfish conclusions. Men of sincerity and goodwill can unite against external aggression and find peace of heart and mind in common cause; but what is to be found in disputations of scant logic, of careless responsibility, of unquestionable selfishness?

We, who are concerned with the affairs of flight, who have a unique responsibility rightly to divide the sky so that the national destiny aloft will be worthy harvest of our trust, cannot afford passion in place of persuasion, rhetoric in place of right or heat in place of light. Our logic and conclusions will be judged by higher courts than hangar tribunals. Yet I have heard regulation of non-scheduled flying castigated as "regimentation" and have read the irresponsible declaration that, "a man has the right to kill himself with an airplane if he wants to." I have heard too charges of bureaucracy and tyranny and deviousness and personal name calling bandied about with such raffishness as to be embarrassing to the quality of the personnel of aviation. This seems to me a more disturbing thing than that airlines must deal with the machinations of maniacs who plant bombs or that we who evaluate non-scheduled flying as the backbone of national airmindedness must continually urge our viewpoint.

The sky over these United States is national domain. Nobody, but nobody, has any *right* up there. Under proper conditions we citizens have privilege, a very different thing indeed. And lucky we are to be living under these conditions, for beneath many skies no such privilege is extended. Moreover, no one has any claim to even so much as privilege in any portion of sky or at any time when that portion is essential to occupation for the national security. And conversely, the forces of security have no right to pre-empt any sky except such as is necessary in the common defense.

In the early days of the Bureau of Air Commerce I was familiarly hailed in the halls at Washington as, 'that vigilante', for truly I felt and still feel that bureaucracy is the foe of freedom. I hope, however, that at no time did I battle bureaucracy in government by the processes of bureaucracy from without. I doubt that victory is ever won, truly won, in the sense of rightly dividing the word of truth, by such charges and counter charges as distinguish the current political aviation scene in Washington.

There can be no question that promotion and control of aviation today is a vast and complicated matter, made even more so by the dereliction of the past and the exceptional dynamic nature of the present. No federal agency will bring immediate order out of this situation. No federal agency will avoid numerous mistakes of omission and commission. But neither is any special group or combination of special groups chosen to be God's anointed in this respect.

I have no thought that the Federal Aviation Agency will surmount its problems in Washington, one agency interlocked into many others and thus victimized to a great extent, without just criticism. This however is a very different thing than bureaucracy whose context is self-perpetuation, concealment, extravagance, deviousness. Mr. Quesada may or may not be the world's wisest administrator of a government service but he is no bureaucrat or self-seeking politician or wastrel or traitor to the best interests of American aviation.

On the other hand, he is a gallant patriot, a great pilot, an intelligent student and a gentleman of honor who is not to be bulldozed. He accepted this responsibility at personal sacrifice and will retire from it at first opportunity after fulfilling basic obligations.

We of the citizenry find ourselves increasingly hard put to muster good men to government—so notorious, ungrateful and ungracious are we in their treatment. Perhaps a "right dividing of the word of truth" begins with a recalling of the golden rule. It is so easy to be critical, impulsive and rhetorical and so hard to be wise, line by line, precept by precept, here a little and there a little.

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AMERICAN AIRLINES *America's Leading Airline*

Malcolm Loughead (pronounced Lockheed), left, and brother, Allan, at the controls of a seaplane which they built in 1918.

LOCKHEED

INDUSTRIAL GIANT OF THE AIR AGE

The early years in the development of a great name in aviation.

By GILL ROBB WILSON
Publisher

Loughead seaplane model "G" made 600 passenger flights at the Panama-Pacific Exposition, San Francisco, 1915.

FOREWORD

In successive issues for some months ahead, FLYING *will carry a series of feature articles by its Publisher, Gill Robb Wilson, on the aircraft industry, company by company, as he has observed it over a span of more than four decades.*

The initial articles will be primarily concerned with Lockheed. It is the Publisher's hope that the series of articles will delineate the significance of each of the corporate entities against the background of our times and give definition to the unique contribution each has made.

THE EDITOR

"THERE were giants on the earth in those days. . . ."

Lockheed is one of the names to conjure with in survey of the stream of modern history—a force in the flood tide of civilization's sweep toward the stars. Thrusting into the four quarters of the airman's world, probing every facet of commerce and defense, equally at home in the province of the pilot and the scientist, the corporate structure built from earliest times until now by the coordinated skill and character of pioneering individuals is a far-flung tapestry of research, development and production.

Man and boy, I have watched the unfolding of its growth, and approach the reminiscence of its almost half century with a tinge of nostalgia but yet of wonder that one pair of eyes could watch the whole of such building. The record is no unimpeachable story of consistent genius. It is much too human a story for that. There have been lost opportunities, failures in foresight, hesitations in decision and all else which accompanies the fallibility of human judgment. But too there have been courageous risings from defeat, humble mendings of mistakes and always a devotion to the light down the middle of the road.

However, before I begin a recounting of such history as I may conjure out of memory or develop from research, I have certain observations to make—applicable to the whole aircraft industry as well as to Lockheed.

Civilization's bequest from the air age isn't so much seven-league boots as seven-league brains. The isolation which cursed the pre-flight era was not so much a matter of long distance as of short sight.

Back down the corridors of time something revolutionary happened every few generations to set society ahead—maybe. Empire was a flimsy thing, often hinging on some bit of trivia such as a crossbow, an iron rivet, a compass. Great economies ebbed and flowed with such gadgetry as a fish net, a beaver skin, a cotton gin, a paddle wheel river boat, a six shot revolver.

Then, in the dawn of the 20th century, a man took wing and fled above the landscape. His flight triggered an intellectual revolution, not because of the technology involved but because men at last had to look up. Priests, prophets and poets had been trying to persuade them to do that very thing since time immemorial—even going so far as to locate heaven above and hell beneath. But men didn't understand the psychological value of an upstairs paradise. They did understand the sights and sounds and smells of the contraption that made mock of dale and distance, sea and season. And it did things to their thinking.

Fundamentally, it divided the lean and lithe from the fat and fatuous. Figuratively speaking, the ones with big bellies and stiff necks couldn't look up. Literally, aviation turned the tide of civilization's inheritance from the intellectually overstuffed to the mentally lean and hungry. Old fortunes were as nothing in contrast to fortunes which beckoned out ahead. Eager minds suddenly found a life of challenge spreading before them. It wasn't that all wanted to fly but, if man could fly, what couldn't he do? And if there was another dimension with which to work, what limit to achievement ahead! It is often said that the progress of the past half century has exceeded that of all previous combined centuries. I suppose such is indeed the case. But the thing that impresses me is not the progress per se so much as the expanded human imagination that produced the progress. It's in the mind of man, not in material phenomenon, that progress has value.

Under the influence of this process of looking up, it has logically come about that revolutionary steps upward have been made in almost every area of human activity—science, medicine, the arts, ad infinitum. From the richest of us to the poorest, we have felt the impact of a civilization that is beginning to learn that its ceiling is unlimited.

And nowhere is this fact more exemplified than in the area of the aircraft industry itself. For example, the step from unpressurized flight in the low altitude to pressurized flight at high altitude was as radical as the step from sail to steam in transocean travel. The leap from visual flight to instrument flight was as phenomenal as the advance from stagecoach to steam engine. The change from piston power to turbine power would compare with the change from steam to electricity in railroading. Progress in the art and science of aviation is perhaps more seven leagued than progress in any other single area of enterprise. It's probably the most exacting area of toil on the face of the earth and it certainly contributes its full measure of excitement to the business of living, even in these ultra modern times.

For example, at this writing an arctic

The Lockheed S-1 with wings folded.

Lockheed built this Vega V-1 in 1927.

The Lockheed Air Express.

The Lockheed-Vega. Executive Model.

Lockheed Orion, an early airliner.

An early military Lockheed, the YP-24.

Below: Wiley Post's hybrid Lockheed.

ice island on which the United States Air Force has been maintaining a research project, is disintegrating and rescue of men and equipment is under way. The ice island has become so small that the rescuing C-130-D Lockheed Hercules pushes the whole mass back eight to ten feet each time it takes off with a load of salvage. Additionally the temperature is 50 below zero and a wind of 30 knots is howling down the arctic wastes. Yet this operation goes on apace and the world's largest ski plane is taken for granted to be capable, dependable, sturdy enough to bring off what would have been considered a miracle even five years ago. Having spent a lifetime covering almost the entire span of human flight, I still stand in awe of such performances. How well I remember when a temperature range of 50 below would have grounded anything that I flew . . . when there wasn't enough power procurable to make a 200,000-pound ship lively enough to operate on an airport, let alone on an ice cake. Yet the Air Force tells me that they made some 2,500 take-offs and landings last year in the arctic with this turbo prop giant and recently have sent six of the Hercules family to the antarctic. In late January, another "first" was added to Lockheed's laurels when a ski-equipped Hercules landed at the South Pole. Imagine that . . . jets at the South Pole! Shades of Shackelton! What a world we live in!

But now this aircraft industry as many of us have known it, man and boy like all things on earth, faces change—not only change in the nature of its products but change in its leadership. And this seems to me a good time to set down certain data and observations for the record. In not too many years those of us who have known it firsthand from beginning to end will be beyond writing of it.

The dedicated founders of the aircraft industry approach their evening. The old order is passing. The era of the professional managers will be established within the decade of the sixties.

Against the background of subsequent history the founders as a whole will appear in the stature of giants. They needed strength of many kinds and they mustered it—vision to foresee, skill to organize, knowledge to plan, courage to make decision, and above all, faith to persist.

Originally, their times could provide little context from which they could draw inspiration. Aeronautics was of necessity the precursor of the scientific climate in practically all pertinent areas—political, industrial, educational, military. John the Baptist himself knew no wilderness more abysmal than some of the ground-bound Washington intellectual desert aviation has had to cross.

To design and construct airplanes is one thing—but how does one effectively motivate a nation to save itself thereby? From whence does one acquire the vision to thread the skein of history before it is unwound from the spool of time? How does one master the political influence to contend for economic backing in competition with decades of intrenched tradition?

It was answers to such questions as these that the founders of the industry had to dredge out of whatever knowledge they could muster of men and affairs.

One time in the mid-thirties an acquaintance chided the writer with the remark that the people in aviation were always holding meetings and "talking to themselves." Yes, I agreed. That was true. But there was a reason for it. They had to talk to themselves because no one else would listen and besides they were talking about survival—not aviation.

As today I look back to the young men who left assured success in some one or other more conventional vocations to follow the uncertain destiny of citizenship in the airman's world—the manufacturing of aircraft—the promotion of airlines—the management of airports—the administration of aeronautics for government or some other phase of air activity, I realize that there was one common denominator for them all. They had a capability for intellectual loneliness. Literally, the comparative handful of men and women who laid the foundations of airpower in all of its aspects in the United States worked in an aura of virtual isolation—and were held there not so much by the idea of carving out a fortune as by a stubborn conviction that the history of flight would determine the history of their country and of civilization; and they could do something about it. Delving into the human story from the ancient sacred writings onward, one notes that just this same dedicated sort of individual has been the main architect of fate in all times and one can't help but wonder whither the airborne ship of state when the motivating forces of the founders are

Carl B. Squier, when he was vice president of Lockheed. Presently a director of the company, he has played a major role in its development.

no longer at play in the industry whose reference points of the future are the very stars themselves. We have no right or justification to think that the professional managers appointed by the vast financial interests who will inherit the aircraft industry and the airlines and the government administration of aeronautics will be less dedicated or less imaginative than their predecessors. But we must yet observe that the difficulty of simultaneously serving God and Mammon has been placed on record as one of the more difficult feats of legerdemain. Perhaps the saving grace of the situation is that patriotism is not necessarily of divine origin nor is the profit motive necessarily Mammon.

However, such contemplations aside for the nonce, it has occurred to the writer that in this interim of change from the old order to the new, some purpose might be served by a series on the founders of the air age at the corporate level of the aircraft industry. One who has observed the full span of airpower with uninterrupted attention recognizes that the great corporations were put together man by man, dollar by dollar, struggle by struggle, disappointment by disappointment, success by success. How victory came out of defeat, how humble men made monumental decisions, how untutored men mustered genius, how a few men, who saw ahead of their nation's necessity, prepared despite opposition to have it—these things cry for the telling.

The story of the aircraft industry is a human story. The most remarkable things

The Lindberghs used one of the first of the Sirius line of Lockheeds on several long range exploratory flights in the early '30s.

Amelia Earhart, Kingsford-Smith (center) and Charles Lindbergh wrote aviation history with Lockheed planes.

about it have been its people. That the great companies well may turn into faceless, bloodless entities beneath which is buried much warm human drama seems to the writer an unnecessary tragedy. Perhaps one can help to avoid some measure of it. Lockheed will be my first subject.

VERY few great streams have a single source and thus too it is with most great enterprises. Lockheed might be said to have been predestined from the time the three sons of Flora Haines Loughead, pronounced Lockheed, were born, since Flora, a novelist and feature writer for the San Francisco Chronicle, was a lady of remarkable education and imagination. The eldest son, Victor, who became an engineer, in 1909, published two notable volumes on aerodynamics, "Vehicles of the Air" and "Aeroplane Designing for Amateurs."

Whoever else the volumes may have influenced, and they were said to be many, Victor's younger half-brothers, Malcolm and Allan, were by no means least. Additionally, the boys received inspiration from the experiments of a neighboring scientist, James Montgomery, Professor of Mathematics at Santa Clara University. Perhaps it was Professor Montgomery with his man-bearing gliders which he air launched, a la modern high speed experiments, from hot air balloons, who was the source of Lockheed.

By 1904, when he was 17, Malcolm Loughead was already an engine repair mechanic with the White steam car agency in San Francisco and, shortly thereafter, Allan, two years younger, was earning his $1 per day as an auto mechanic with Ivan de Jough in the same city. By 1910, Allan was a race driver and on one occasion drove his Corbin against Harris M. Hanshue in an Apperson Jackrabbit. Hanshue, as all old pilots will recall, also turned to aviation and eventually became President of Western Air Express, predecessor of Western Air Lines.

Now Victor, acting for one James E. Plew, Chicago distributor of White cars and trucks, returned to San Francisco to negotiate with Montgomery for production rights to one of his gliders. Plew wanted to get into the aircraft business. The idea was to install an engine and thus originate a line of planes without high development cost. Plew also purchased a Curtiss pusher and hired young Allan Loughead as his mechanic. Selling his racing car despite the protests of friends, Allan stuck his neck out in a radical forecast that aviation would become the safest of all ways to travel at speeds up to 50 miles per hour! And took off for Chicago.

One of the oddities of aviation history is that Allan, who had never yet been aloft, made his first flight as a co-pilot in a single-place airplane in which there were no dual controls. To the best of the writer's knowledge, Allan Loughead is thus the peer of all co-pilots. At least I never heard of anyone who functioned thus previously. It happened this way.

By the time Allan arrived in Chicago to work for Plew, the Aero Club of Illinois had been formed and operated from a field in the vicinity of 22nd Street and 52nd Avenue. One of the members, George Gates, had built a pusher biplane with controls so rigged that no one man could fly it. Gates asked Allan Loughead to work the ailerons while he manipulated the rudder and elevators. And, believe it or not, these two novices took off in the 50 hp contraption, made a successful flight and landed without incident. Allan sat piggyback behind Gates and manipulated the aileron control wires with his bare hands—sans wheel, sans stick, in fact, sans anything but a cool head and luck. And who will say that these ingredients did not become a Lockheed heritage! They have always had strong men for critical jobs.

And now Allan taught himself to fly by the simple expedient of taking the Curtiss pusher aloft from the Hawthorne racetrack on the outskirts of the windy city. His associates, Pilots Jack Hogan and Otto Brodie, the latter a nephew of Brooklyn Steve Brodie; hadn't been able to pry the skids loose from the December snow, but Loughead—whose sole experience was his flight with Gates—offered to bet $20 that he could get the Curtiss upstairs. He did—so now he was an aviator.

Surviving numerous crackups in the bamboo and bailing wire chariots of the day, the red-headed Allan learned a lot about the way airplanes should not be built. Additionally, ideas of how they should be constructed were milling around in his mind and in 1912, with his

(Continued on page 87)

Ben Eielson and Sir Hubert Wilkins.

James H. Doolittle and (below) Wiley Post.

Seventy jet passengers

confide to

the inquiring reporter on FLIGHT 45

BUMPER TO BUMPER traffic moving inch by inch. It's the jet age, the day of 600-mph transports for air travel, and the day of turtle-pace travel on super crowded highways.

I left home near Huntington, Long Island, in what should have been plenty of time—one and one-half hours to go 30 miles. Here I am: Fifty-five minutes gone and ten miles to go. At this rate, 100 yards every five minutes, and TWA's jet will be well along toward 'Frisco before I reach Idlewild.

It's strange. A sizable percentage of business travel out of Idlewild and LaGuardia comes from Long Island's Nassau and Suffolk Counties, yet the whole pattern for airport transport is geared to Manhattan.

Twenty yards . . . then 50 . . . stopped again! Twenty-five minutes 'til take-off time.

Thousands upon thousands of people driving to work! How many among them are getting ulcers about missing airplanes—maybe the same jet? Hurray! We're moving! It's opening up at last!

With five minutes to spare, I wished my wife a safe trip home and bounded into the terminal.

"Calling TWA Flight Number 45, non-stop to San

Veteran air traveler Davis was curious about that flourishing new species of aviation customer—the jet passenger. Here's his story.

By LOU DAVIS

Left: Inquiring reporter Lou Davis. Center: Couple and their baby with friend in lounge of 707. Right: Tri-Pacer owners enjoy change of pace.

Francisco—now loading at Gate One!"

More than 1,500,000 passengers have flown jets to date and I was at last to be one of them.

Other passengers, like myself, approached the loading area with great expectancy. After all, this was the first commercial jet ride for most of us. Here and there a man or a woman carried a smug, nonchalant expression of a million-miler. Were they forcing that sophisticated air or were they truly "pioneers" in jet travel? We'd find out, once airborne.

Almost all couples, young and old, carried cameras. With mild embarrassment some insisted upon making snapshots of each other before loading, just in case "there may not be time at San Francisco." Flight Number 45 was loaded and ready as scheduled at 9:30 —an average load of 115 passengers was aboard. Its crew was headed by Capt. Stanley "Toots" Kasper, senior pilot for TWA, who was an All-American at St. Mary's College in 1929.

With Captain Kasper was First Officer Orium Howard, Second Officer Hollis Martin, Flight Engineer Edward Manges.

In the enormous 707 cabin, Chief Hostess Bobbie Patek, and her companion hostesses Phyllis Adams, Franca Terre and Ronnie Greenfield, were busy showing passengers to their seats, placing them at ease and, of course, answering the inevitable questions:

"How soon do we take off?"

"How long will it be until we get there?"

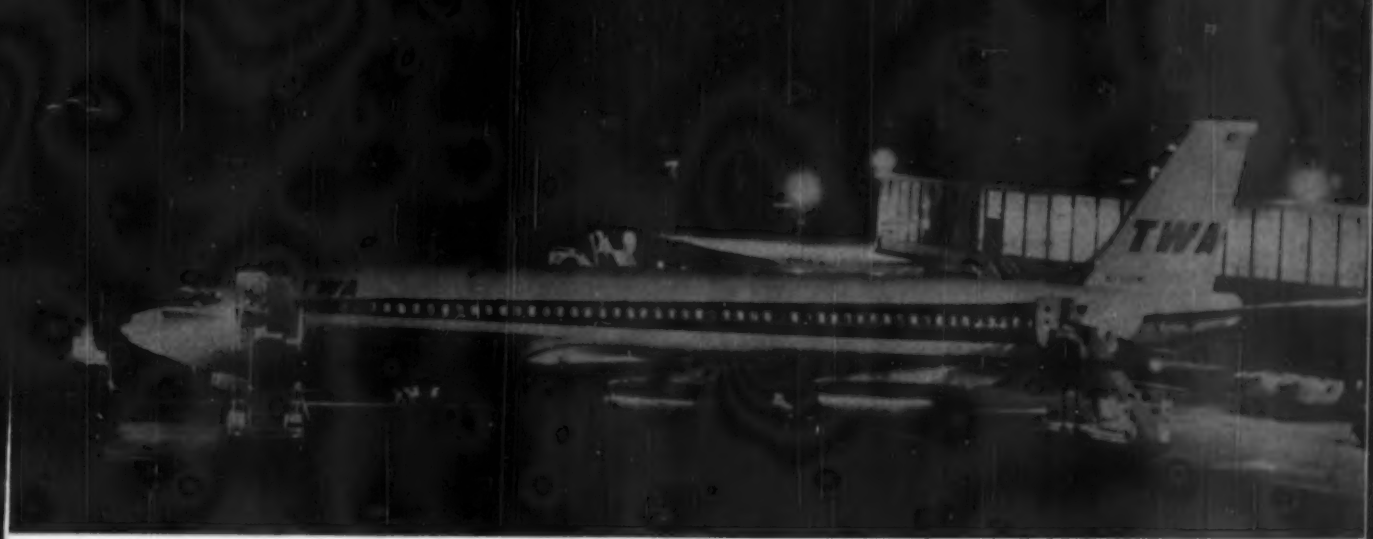
"Is the weather good?"

And, "Do you think I'll be able to make my connection?"

On a walk through the first-class and coach sections of the cabin, it was obvious that passengers who were old hands at piston-engined plane travel were splitting with impatience to ask about the jet. Those few passengers who had flown the 707 before lost no time in sharing results of their experience with first timers.

At 9:35 a.m., Captain Kasper received the all clear signal to close doors and start engines.

Within 60 seconds, the rising scream of Number One Engine was followed in quick time by its three sister J-57 15,000-pound thrust turbines—that new form of power that was to speed 115 passengers and a heavy load of cargo westward at near 600 mph speeds. Engines idling, *(Continued on page 72)*



Left: "Jet travel is so relaxing." Center: The boy found the flight "boring" but Grandma enjoyed every minute. Right: The crew of Flight 45.

THE AIRMAN'S WORLD

How often do we airmen descend from the star studded remoteness of high night flight to the bright tapestry of the city set on the rim of the dark bowl beneath. How often take place in the pattern of the ships home coming above the multi-splendored lights along the tracery of the streets and streams and from the yellow panes which checker the shafts of the tall buildings and from the windows of the dwellings, with hearts warmed in anticipation of rest after toil and glad reunion with loved ones.

Could this be like unto that rendezvous which all men make when their immortal souls are cleared to leave the cruising of the dim marked ways so underfloored with doubt? Is life eternal no vast leaping out but rather quiet letting down to some bright city of the soul where streets and streams are traced in truth's own light and loved ones resident from long ago await for landings yet by such as we? I do not know but when I'm on approach at night sometimes this seems to be a likely thing to me.

GILL ROBB WILSON

The Port of New York Authority

The inside story of the

Hortons

A MAN AND WIFE TEAM HAVE DESIGNED AND FURNISHED INTERIORS FOR MORE THAN A THOUSAND BUSINESS AIRPLANES AND HELICOPTERS

By JAMES H. WINCHESTER

A CENTRAL ORGANIZATION, utilizing the services of individual companies who are specialists in their particular fields, whereby an owner can arrange for everything from interior design to airframe modification to crew proficiency checks with only one call, at one location, and with only one billing, is the latest service concept to be launched in the private and business aircraft field.

Located at Meacham Field at Fort Worth, Tex., the new facility, known as Inter-America Aviation Modification Center, began operation with the start of 1960. Six companies contribute service as needed in this new set-up. They are Horton-Horton, aircraft interior design, engineering and fabrication; Associated Radio, electronics; Dallas Airmotive, engines; Aircraft Tank Service, tank sealing; Airline Instruments, aircraft instruments and repair; and Flight Proficiency, crew training.

Key to this new service concept is lower prices to aircraft owners, reductions which can be achieved where a combination of services is used because the various companies' specialists can work on a plane simultaneously, achieving much lower "down time" for the craft.

Behind the formation of Inter-America are Bill and Dorthe Anne Horton, a unique aviation age husband-wife team.

During the last decade, working on a concept of "functional luxury," the Hortons have made their Fort Worth based company—Horton-Horton—one of the busiest and best-known in the aircraft interior design trade. Among their private aircraft or business plane trademarks now winging around the world are blue sugar for in-flight coffee klatches, bulkheads encrusted with uncut semi-precious stones, powder rooms lined with sequin-set white leather, seats covered with zebra hides, cabinetwork processed to simulate antique Chinese woodwork, flying wine cellars and statuary of Egyptian princesses.

In designing and executing aircraft interiors, the Hortons' philosophy is straightforward: a business aircraft must fulfill a specific purpose; ergo, so must its interior. Thus, before rough sketches of a new aircraft interior design leave their drawing board, full determination is made of just how the plane is to be used.

There was the Lockheed Lodestar, as a typical instance, whose interior they redesigned for the Pfeiffer Brewing Company. The plane was to be frequently used to take distributors to sales conventions. Since the company's products were to be served as in-flight refreshments—and everyone knows the propensity of beer to spurt when tapped or opened at high altitudes—the plane's furnishings were covered with washable plastics.

For another client, who shall be unnamed, the Hortons were more flamboyant, embed- (*Continued on page* 84)

Examples of "the Horton treatment" of executive aircraft interiors. Top: Bell's "El Picaflor de Plata," the Silver Hummingbird, equipped with its own red carpet to roll out for inspecting dignitaries on South American tour. Center: The Fairways Corporation Convair 440. Bottom: The Westinghouse F-27 is dominated by mural of an astral sphere in orbit around the earth, executed in one of the company's products, Micarta. Opposite page: The Hortons and static test model of new chair. Mooney Mite and converted B-25 in background.

To acquaint our readers with various requirements for each type of flying and the characteristics of the major equipment on the market, we present the first half of an article about

AUTOMATIC FLIGHT CONTROL

By BASIL DELTOUR

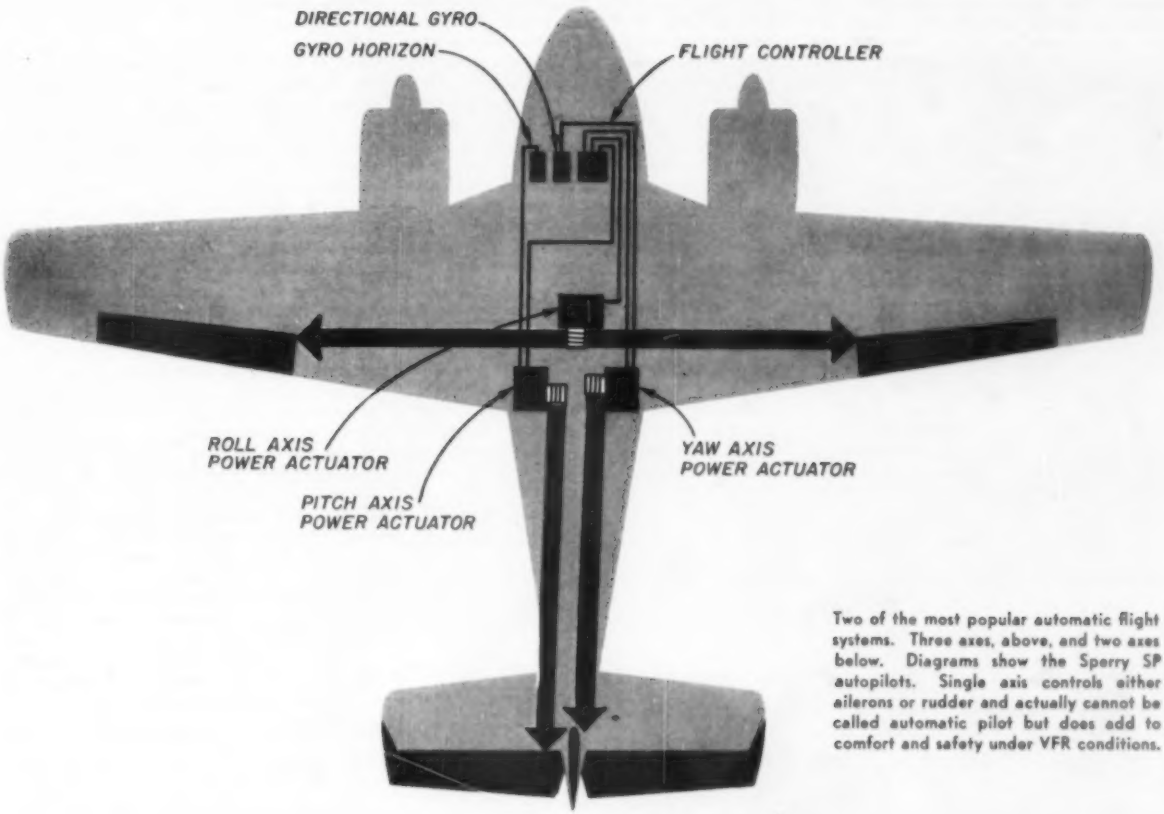
WHETHER you are a private pilot flying a 172 or Tri-Pacer or one of the fortunate few that man the twin engine business fleet, you are probably interested in the various flight control systems that are available and advertised every month in this magazine. You are also, perhaps, just as confused as you are interested and have been delaying the purchase of this type of equipment until you can obtain the answers to some mighty important questions.

Any question that involves $700 to $5,000 is an important one. Because of the amount of information available on different types of aircraft, it was not too difficult to select the make and model that best met your transportation needs. The same may not be true with automatic flight control systems. It is easy to find people that can talk objectively about various airplanes but few have had experience with the several types of automatic flight systems and can give you the same objective viewpoint. Therefore you are on your own when you decide to buy. What do you do with the equipment if it doesn't perform as you thought it would or should? The various alternatives are all costly and inconvenient. The obvious approach is to make the right selection the first time. But the proper selection for you may not be the one for the next man and the purpose of this article is to acquaint you with various requirements for each type of flying and the characteristics of the major equipment on the market.

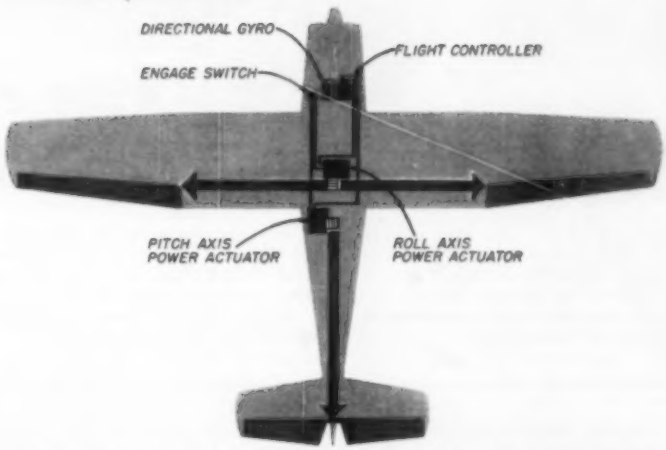
You will notice that there has been not one mention of autopilots but only a reference to automatic flight control systems. That brings us to definitions. Automatic flight control systems include all types of equipment that, through the use of one or more elements connected to the aircraft's controls, provide stabilization about one or more of the airplane's axes. On the other hand, an autopilot by definition controls the stability of the aircraft about all three axes and is therefore a special type of automatic flight control system.

The first step in the selection of an automatic flight control system is to determine what your requirements are, based on the type of flying you are doing normally and how much loose loot you have lying around. If you are strictly a VFR pilot and intend to remain so, then your primary problem is one of automatically maintaining a heading and a level wing attitude when cruising, so you can consult a chart, tune your radio and have a snack in smooth or moderately rough air with only an occasional reference to altitude and power settings. This will also relieve you of the need to monitor the compass constantly and will give you plenty of time for the observance of other traffic. I was surprised how much traffic I noticed the first cross country trip I made with an autopilot doing the flying. I still wonder if as many were there on other trips, and if so, how did I miss seeing them? I also noticed more details of the country over which I was flying.

For the average VFR pilot, anything more than a good single axis system may be a luxury. There is a second type of VFR pilot, however, where a two-axis au-



Two of the most popular automatic flight systems. Three axes, above, and two axes below. Diagrams show the Sperry SP autopilots. Single axis controls either ailerons or rudder and actually cannot be called automatic pilot but does add to comfort and safety under VFR conditions.



PART 1

SYSTEMS

topilot can be considered to be something other than a luxury. This is Mr. Businessman, who pilots his own single-engine airplane. (He may have an instrument rating but, for the moment, let's assume he doesn't use it.) This man puts in long days when he flies and a system that will maintain a selected heading, hold altitude within reasonable limits and fly the airplane completely in rough air will help him arrive at his destination in a relaxed state of mind which is conducive to good business. On the trip home, late in the afternoon or evening, the autopilot will reduce his fatigue and, therefore, the possibility of a serious mistake in the other operational procedures associated with his airplane and navigation.

If this type of business pilot is going to make departures and approaches under IFR conditions, then a two-axis autopilot is the minimum equipment he can comfortably settle on. A single-axis unit might help his fatigue factor under VFR conditions but it does not provide sufficient control under IFR to be of material assistance to him. Holding altitude or controlling a rate of climb or descent is a tough part of flying IFR and you have to do this while you copy a clearance, look up a new chart, or compute an ETA. For a professional pilot this is considered a big load. For the businessman, who may be flying when he has already completed a day's work or when he hasn't been IFR for weeks, it may well be impossible. Therefore, an autopilot with at least pitch, roll and heading control could be considered as a necessity from a safety standpoint under IFR conditions. It is true that a good number of businessmen pilots are operating IFR without the help of any automatic aid or with just a single axis unit but they are losing considerable utility and shrinking their safety factor.

This sounds a little like sales talk; however, I have experienced how this type of equipment can reduce fatigue and increase the utility of an airplane with only one pilot aboard. Besides, if there aren't any good reasons for buying an autopilot there aren't any good reasons for writing this article.

Professional pilots are divided in their opinions of what is required of an autopilot and it is not within the scope of this article to resolve this difference. One group wants it to do all the flying from the time the airplane is over the boundary at take-off until it breaks out of the overcast at their destination. This includes keeping the airplane on an omni track and the localizer and glide path during ap-

proach. This requires considerable additional equipment to convert the omni and ILS signals into something the stabilization circuits of the basic autopilot can use for control. These accessories add weight and power drain as well as increase the cost.

A second group of professional pilots feel that they need the autopilot only during the time they are necessarily doing something else in the cockpit. The fact that it can fly the airplane 95 per cent of the time is considered by them as a bonus rather than a necessity. This group also feels that because the simpler autopilot, that can do this basic job, weighs less and takes less power, it therefore provides room for other badly needed equipment. In the end it depends on the airplane you are flying and how you are using it. If it is one of the lightest twins and you fly it with all seats filled and full tanks then you're going to have to give up some of the frills to save weight. On the other hand, if it is seldom flown at gross weight or is a heavier airplane where the electronic equipment is a smaller part of the gross weight, then perhaps you can have all the extras and retain aircraft performance.

There is a third group in the professional ranks that is in the minority at the present time but which may well increase in the future. These fellows are probably closer to the second group that we mentioned than the first. They want an autopilot on board or another human pilot if they are to operate IFR. They feel that airways complexities are just too much for one pilot to do the job safely.

Something should be mentioned here about basic autopilot or control system principles so you will better understand the analysis of the various systems that follows. Whenever you are flying your airplane and a bit of rough air causes the wing to drop, your visual reference to the horizon is changed and subsequently you move the controls to restore the wings to a level position. The same process occurs in an automatic system, as you might suspect, and, for the purposes of this discussion only, the roll axis of the airplane will be considered as the pitch axis works in much the same manner. In the automatic system it is necessary to detect the direction and amount of aircraft attitude displacement by some artificial means and then operate a force device connected to the control surfaces to restore the aircraft to the original attitude. The attitude detector or sensor is usually a gyroscopic instrument and, in the case of low cost autopilots, it is a surplus gyro horizon that has been modified to include the type of position sensing devices that meet the requirements of the particular manufacturer's system. These instruments, or rather their prototypes, are then extensively tested to insure they meet the minimum requirements of the FAA if they are to be installed in the instrument panel and used as flight instruments. The force device, or servo, connected to the control surfaces takes on many forms. In one system it is a pneumatic bellows but in most it is an electric motor connected through a clutch to the aircraft controls. The clutch is always designed so that it will slip when a certain torque is reached so that a pilot may override the system in the event of a malfunction. The bellows type must not exert so great a force that the pilot cannot override it.

Between the attitude sensor and the servo, there is usually some sort of an amplifier. It may be only a relay or it may include a battery of electronic tubes or transistors. The system of amplification used is what distinguishes one manufacturer's product from another's more than any other feature.

With an autopilot installed, a displacement from level attitude is detected by the modified horizon gyro and it sends a signal through the amplifier to the servo that will cause it to move the controls in the proper direction to return the airplane to level. However, direction of movement is not enough information to send to the servo. Ideally, the servo speed and amount of movement should be proportional to both the displacement angle and the rate of roll. Thus, if a wing drops rapidly, the servo should move the aileron rapidly and far enough to stop the motion. Of the so-called low cost autopilots, only one incorporates this feature. The rest are known as displacement autopilots since the controls move only in proportion to the displacement from the level or command attitude and do not incorporate any rate information. The manufacturer must adjust the rate of motion of the aileron so as to have it operate fast enough to keep the airplane level in rough air and yet slow enough so that it does not seem jerky in smooth air. Fortunately, this isn't too hard to accomplish. This might lead you to think that autopilots must be tailored to each type of airplane and this is true but not to the extent you might suspect. Once a pilot has learned the necessary responses in flying, he can handle almost any airplane in flight.

It's the take-offs and landings that give him trouble. This is because airplanes are tailored to the pilots that fly them, since humans have only a certain maximum capability to respond to outside information. (In the case of some supersonic jets, the pilots aren't able to fly them without some sort of aid from an automatic flight control system.) In the airplanes that can be equipped with the low cost autopilots, the necessary response during the regimes of flight where they can be used are essentially the same. Therefore one autopilot will fly most types of airplanes about the same. The minor differences between airplanes are taken into consideration when the manufacturer designs a special installation kit for a particular type and it is also considered by the FAA before they grant a supplemental type certificate.

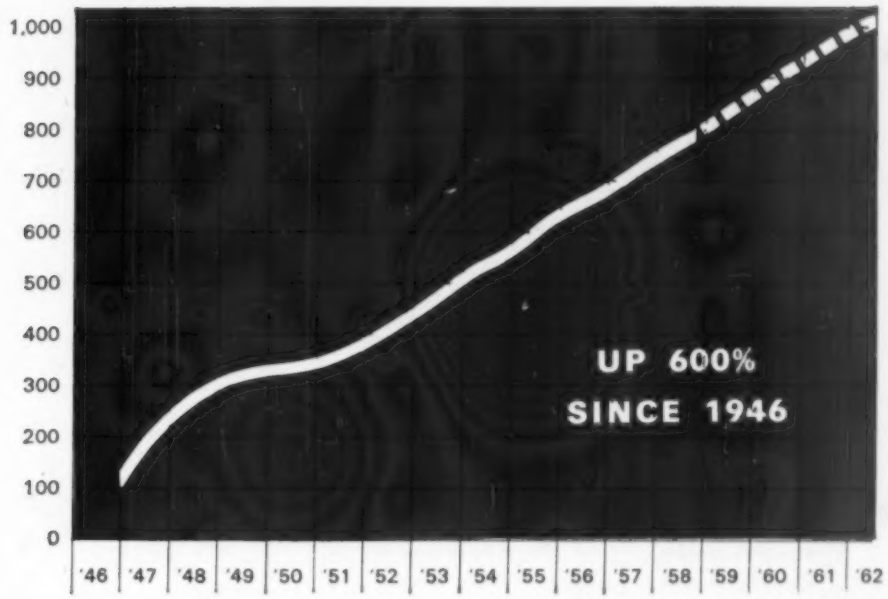
Getting back to the basic principles of autopilots, once a wing has dropped and the servo has moved in response to the signal from the gyro, the airplane will start to roll back to the level attitude. The gyro must then sense that corrective action is in progress and to what extent so that the signals it sends out will result in the ailerons being streamlined at the wings level position, to stop the roll. In practice this is accomplished by having an element on the servo shaft similar to the element in the gyro that sensed the original position error. Thus, when the servo has moved far enough, the signal from the element on its shaft cancels out the signal from the gyro and the system is in balance. In the parlance of autopilot experts, this is called "follow up." If the airplane starts to roll to the level position as a result of the servo action, the signal from the gyro will become smaller than that from the (*Continued on page 83*)

BASIL DELTOUR has been flying since 1946 and is president of the National Flying Club Association.

A stint in the Douglas Aircraft research labs developed his interest in aviation electronics.

Instrumental in developing a completely new concept of remote control aircraft via a radio link, he presently serves as Sales Manager, Commercial Aviation Products, NAVCO Electronics Industries, Inc.

BUSINESS AVIATION — MILLIONS OF MILES FLOWN



Steady rise of business aviation is apparent on chart.

FAA Data

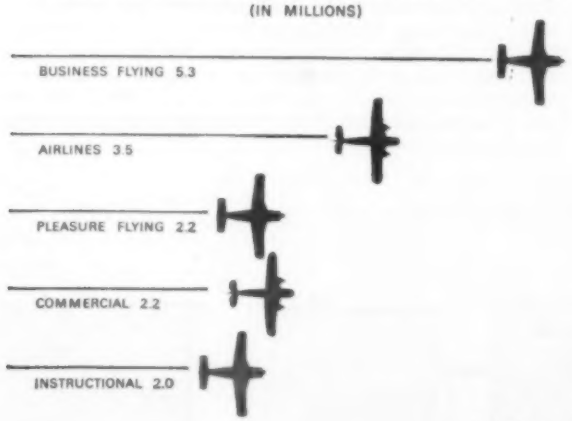
HOW PIPER MARKET RESEARCH HELPS

Today's plane salesmen sell time

By LAWRENCE E. DOYLE

HOURS FLOWN IN U.S. AVIATION — 1958

(IN MILLIONS)



FAA Data

HARD HITTING packages of facts designed to sell business planes to skeptical or unenlightened companies still operating without them is the order of the day for business plane producers in 1960.

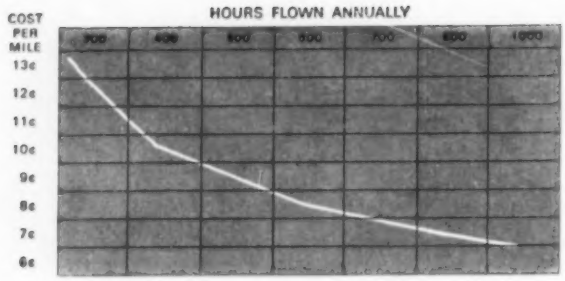
This year as never before, industry salesmen are reaching out to influence and convince prospects that time is truly a measurable quantity, that today's business executive cannot meet competition economically without the aid of wings for mobility and flexibility.

More and more, prospective buyers of business planes are "from Missouri"—men who buy on cold facts and hard dollars, not romance. It is this market that offers the great potential of the '60s.

One of the current major sales efforts is based on a study conducted for Piper Aircraft Corporation by the Connelly organization, Detroit specialists in auto market research and evaluations. This $30,000 investigation produced some impact-wielding facts. It is comprehensive and representative of the collective industry-wide drive.

Piper sales representatives are carrying this package of sales ammunition in attractive and graphically engineered presentations to the prospects. This new sales approach permits them to shoot from the hip in the prospect's own fortress, his office or the board room, and miles away from the airport, the traditional scene of combat.

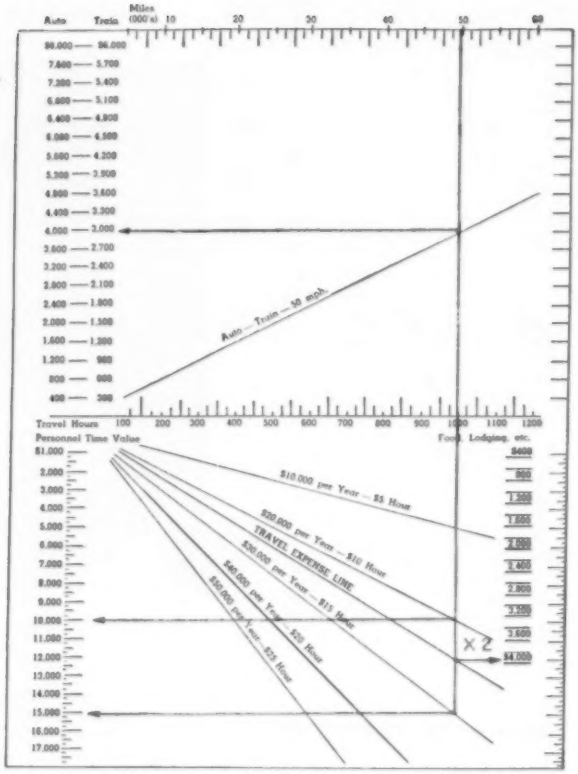
The complete presentation backs up the salesman with orientation information, sequence of sales approach and supported facts having to do with eight major topics: a resumé of business flying statistics today; comparison of flight safety with other forms of transport; fundamentals of weather and its effect upon B-plane operations; simple



COST PER PASSENGER MILE DECREASES AS NUMBER OF PASSENGERS INCREASES

EXAMPLE: Comanche 180 traveling 300 hours (46,500 miles) per year

	COST PER PASSENGER MILE
BUSINESSMAN-PILOT	12.8¢
Plus 1 Passenger	6.4¢ per passenger
Plus 2 Passengers	4.3¢ per passenger
Plus 3 Passengers	3.2¢ per passenger



By automobile, 50,000 miles of travel costs 74 cents per mile for two.

navigation; simple steps in learning to fly while traveling for business; the Piper philosophy; comparison of travel habits in realistic door-to-door performance; and, last but most important, the economics of operating a company plane.

In the latter category, the Piper story relates initial investment, utility costs including executive time in terms of dollars and cents, depreciation and re-sale value of aircraft. Through proper use of tax credits and conservative write-offs, it demonstrates that a company may own and operate an aircraft for four years and wind up with an out-of-pocket cost of $600.

Quick reference charts permit salesmen to project quickly and simply what the per-mile cost will be for one passenger or two, and how these costs compare with bus, rail, airline and auto transport for business personnel.

Here are some of the highlights:

• With one hour added to airline flights for the usual waiting periods and ground delays, a business man can travel the 735 miles from Chicago to New York by airliner in three hours 24 minutes; by the twin-engined Aztec type of business plane in three hours, 40 minutes; in a Comanche 180 in four hours, 45 minutes; in an Apache one hour, 54 minutes; and by automobile in 14 hours, 42 minutes. From Des Moines to Chicago, 315 miles, that same business man can beat the airline schedule (which has an intermediate stop) with a private plane: In the Piper Aztec type, flying time is one hour, 33 minutes; the Comanche 180 makes the trip in two hours, two minutes. Even the 115 mph Tri-Pacer can beat airline schedules by 19 minutes (2 hours, 28 minutes). The automobile requires 6 hours, 15 minutes.

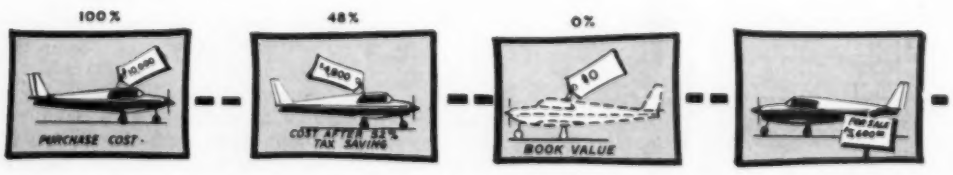
• A detailed comparison of time and costs for two men is presented. The trip covers nine cities for a distance of 1,275 miles within five days by company plane and eight days by airlines. Total cost for two in company plane, including executive time, was $1,524 and $2,251 by airliner.

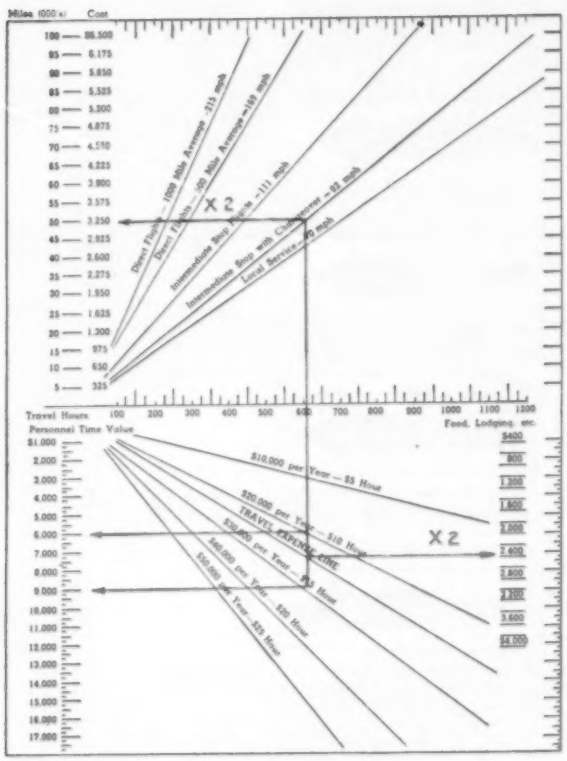
• Per mile costs of common forms of transportation including straight fare cost, value of travelers' time, food, lodging and other expenses, are deemed to be conservative. Two executives, paid $10 per hour per working day, traveling at the rate of 50,000 miles per year, travel by auto at 32 cents per mile each; by airline at 23.3 cents per man per mile; 16.2 cents each by Tri-Pacer type of company

How airplane operating costs are figured (100 per cent business utilization).

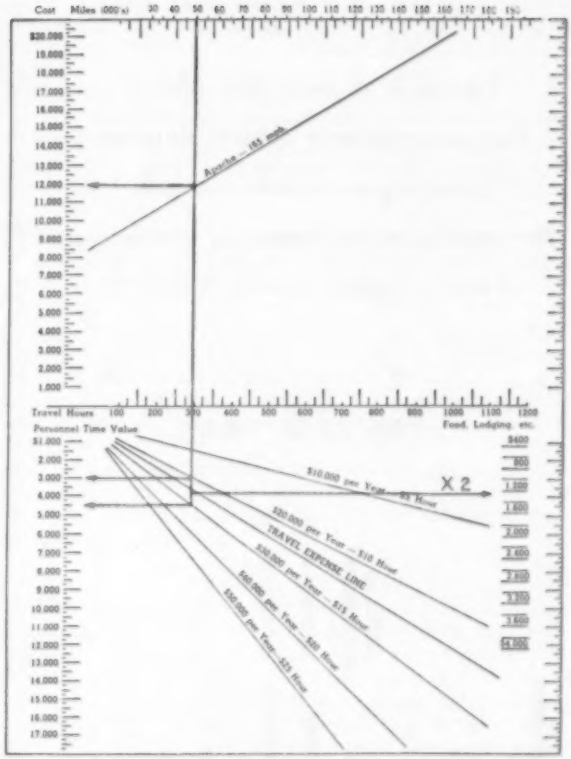
EXAMPLE:

- COST OF AIRPLANE IN INCREMENTS OF $10,000
- STRAIGHT LINE DEPRECIATION
- 52% TAX BRACKET
- 4 YEAR OWNERSHIP
- NORMAL MARKET VALUES





By airlines, 50,000 miles of travel costs 52.6 cents per mile for two.



By Apache, 50,000 miles of travel amounts to 44 cents per mile for two.

plane; and 20.2 cents per mile by the 180-mph Apache type aircraft. Straight fare costs per mile for one man by bus is 3½ cents, by train 6 cents, and by airliner 6½ cents; for one or more persons by car 8 cents, and 10 cents by Tri-Pacer type company plane; 12 cents by Comanche, and 23½ cents by Apache.

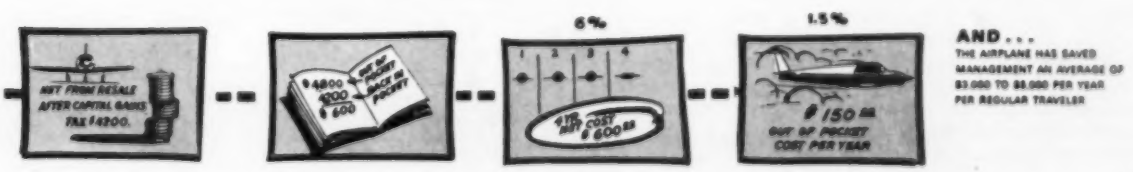
• Summary charts plot the advantages of lease purchase arrangements and the indirect effect upon real costs after depreciation and resale factors are considered. In short, the report shows that a new plane costing in the neighborhood of $10,000 has a real cost of $4,800 after 52 per cent tax saving, can be written off completely in four years and can be resold at $5,600. Net gain from resale after capital gains tax is estimated at $4,200. The four-year net cost is $600 and the researchers estimate the plane will have saved the user $3,000 to $4,000 a year for each regular traveler.

In its discussion of safety, the survey points out that government statistics for 1958 show that fatalities per 100,000 hours of flight were .81 for executive flying in planes under 12,500 pounds, 1.12 for executive aviation generally and 3.78 for U. S. airlines. The figures are used to stress the fact that the corporate aircraft safety record is better than that of general (non-airline) aviation, which is frequently called disappointing.

It is estimated that business planes averaged more than a million miles between accidents in 1958. "A very satisfactory level of safety prevails in executive (corporate) flying and illustrates a high level of pilot competency," the Civil Aeronautics Board stated in its report on "General Aviation Business Flying Safety, 1951-1956."

The survey notes that "flying is substantially safer than automobile driving." One out of 51 licensed motorists was involved in serious accidents in 1958, according to the National Safety Council. One out of 597 licensed pilots was involved in serious accidents the same year. In distances between accidents for 1958, motor vehicles covered an average of 66,500 miles while business planes averaged one accident every 1,004,000 miles.

In its discussion of airline versus business plane use, the survey says, "On countless trips, ground time slows airline travel to second best speeds." The survey, in computing its comparisons of airline and executive aircraft travel time, allows one hour (*Continued on page 58*)



There is a long life ahead for powerplants which depend upon atmospheric oxygen for combustion. Some of them can achieve speeds up to Mach 9.

THE CASE FOR

air breathing engines

By D. P. EDKINS
Small Aircraft Engine Dept., General Electric Company, Lynn, Mass.

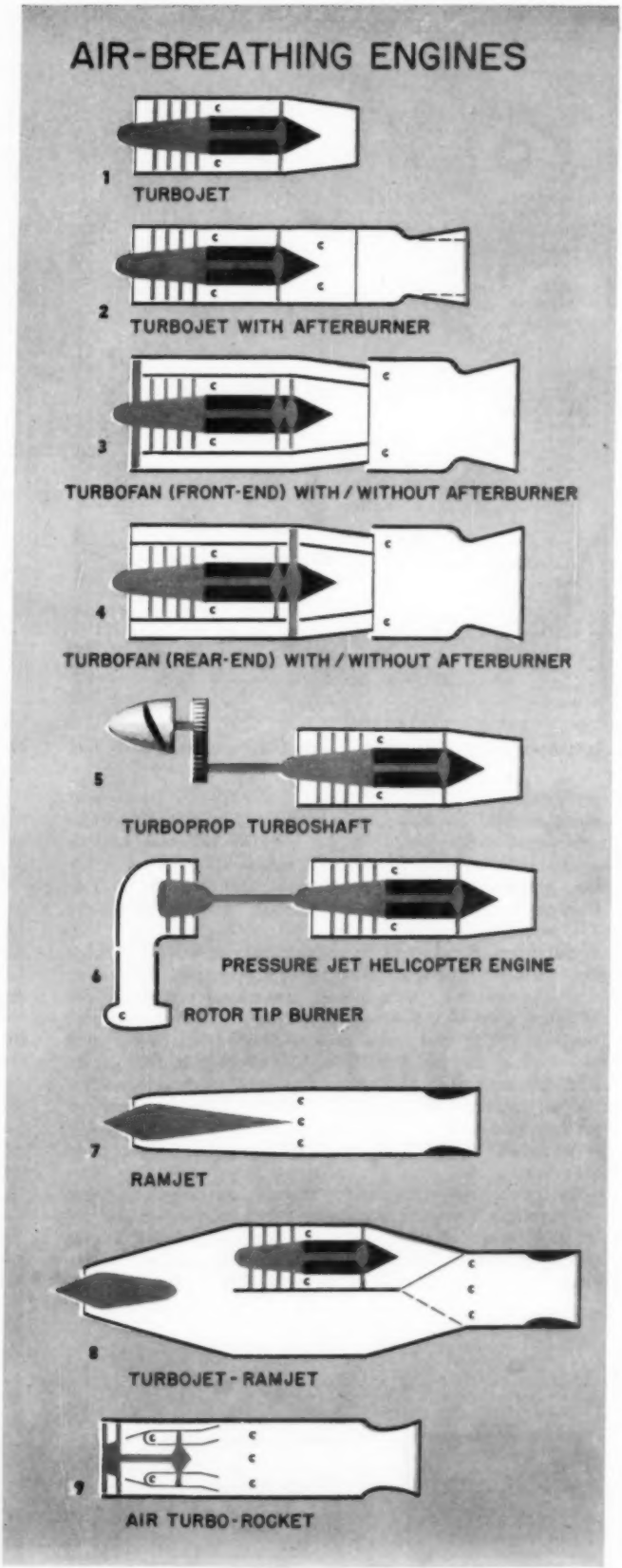


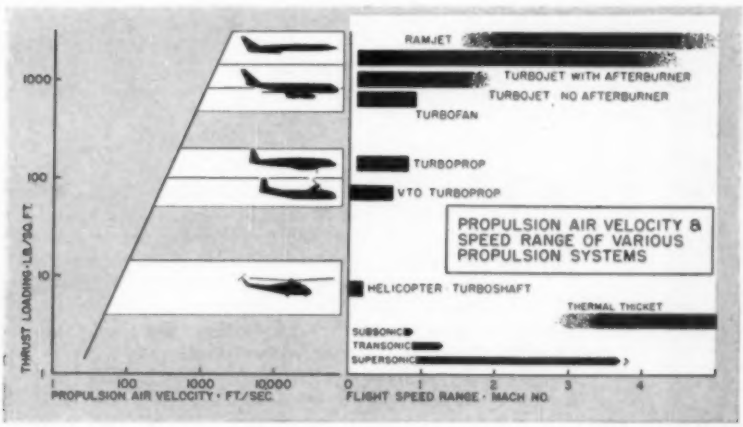
Fig. 1. Some important air breathing engine types.

IF WE COULD sit up in space and get a moon's-eye view of the earth, (as we well may be able to do in the not-too-distant future) we would notice that the atmosphere was extremely thin in comparison to the earth's diameter.

The atmosphere does not end at any precise point above the surface, but a mere one-quarter per cent of the earth's diameter can be taken as representative of the atmosphere's thickness. Another way to realize how thin the air layer is, would be to imagine it as a thickish coat of clear varnish on the small terrestrial globe that you perhaps have at home.

It is not surprising that we might expect to travel from one part of the earth to another by first moving upwards the relatively small distance necessary to get clear of the air, and in fact that is what we are now beginning to do in the missile field.

However, there are also good reasons for staying within the atmosphere for many purposes of non-surface travel around the earth. These reasons can perhaps be reduced to two fundamentals; first, free oxygen; and second, the ability to produce forces by momentum changes of the air. Let us examine why these two factors are of such interest and importance.



FIGURES 2 and 3. Propulsion air velocity and speed range of various propulsion systems.

With the exception of nuclear energy systems, propulsive power has to be obtained from combustion of fuel; and the oxygen for this is free as long as we stay within the atmosphere.

This is a rather obvious statement, but it is not always realized how vast are the quantities consumed. For example, a jet airliner traveling across the continent will burn about 450 tons of oxygen. We at once see the inherent difficulty of having to carry oxygen along if combustion has to be sustained outside the atmosphere.

The way to make a self-contained oxygen supply pay off is to travel at a very high speed, and this is not possible within the atmosphere because of aerodynamic heating. The thermal "thicket" is much more of a road block than the so-called "sonic barrier." It is true there are rocket powerplants in use in atmospheric missiles—short-range devices where the great simplicity and light weight of the rocket, particularly if solid fuel, is of prime interest. However, they are relatively inefficient and could be improved upon with other propulsion systems.

The ability of air to produce forces on an aircraft is a very important and valuable one. All such forces are beneficial with the exception of drag forces and there are even instances where drag is useful, for example, in a parachute. The attainment of stability and control is fundamentally simple on any aircraft which remains within the atmosphere, although there are, of course, practical difficulties as in any complex engineering field.

It is not generally realized what an efficient vehicle a fixed-wing aircraft can be. Take, for example, an ordinary DC-6 traveling at 300 mph with 50 passengers. It needs about 400 gallons of fuel per hour and so does about 37 miles per gallon per person. So, when you get 15 miles per gallon in your automobile, you are inefficient compared to a DC-6 in terms of the amount of fuel it takes to carry one person, unless there are three or more people in the car. Remembering that the airplane is going about seven times as fast into the bargain, it can be appreciated that its efficiency compares favorably with at least one form of surface transport.

One important reason for this high efficiency is the degree to which the drag of the aircraft has been reduced over the years. The drag of an aircraft such as the DC-6 has been reduced to that associated with the friction of air passing over the surface plus the drag necessarily incurred in any heavier-than-air device associated with providing the lift forces.

The lift/drag ratio and specific fuel consumption are the airframe and engine yardsticks for measuring the state-of-the-art in these two fields. The three quantities—lift/drag ratio, specific fuel consumption and flight speed can be combined into a single range index. This index is essentially the product of speed, airplanes and engine efficiency, and represents the range potentially available from any given amount of fuel.

Of course, there are less efficient aircraft and less efficient speeds of flight. In general, fixed-wing jet aircraft have high cruising efficiency at subsonic speeds, but take a drop in the low supersonic region where the decreased lift-drag ratio has not been counterbalanced by the growth of speed. However, at the higher supersonic speeds efficiency rises again, part of which is due to the possibility of using favorable interference effects on large aircraft to reduce drag and thereby improve L/D. The effect of aerodynamic heating also limits the extent to which the rising efficiency with flight speed can be exploited by requiring increasing amounts of weight to be devoted to structure and cooling and thus eating into the payload.

So far, we have discussed the value of flying inside the atmosphere from the standpoint of efficiency and ease of control. The efficiency aspect is applicable to any aircraft but primarily to the transportation function. However, there are other reasons for staying within the atmosphere in military aviation, and therefore using air-breathing engines; if the air is there, we must have a good reason not to use it for propulsion. In the military field it is clearly necessary to fly in the atmosphere with any missile, as perforce it must either be ground-launched or air-launched, for at least part of the flight. Whether an air-breathing engine is used depends on the objectives of the missile. Thus a good reason why we do not choose the air-breathing engine to power an ICBM is because very high speeds can be achieved by use of rockets, with the consequent tactical advantage in reduction of flight time. Even for such a missile, the possibility exists to use jet engines for the first stage of (*Continued on page 60*)

By FLYING STAFF

Precious minutes can be saved by the use of this fixed base facility, if your destination is Manhattan.

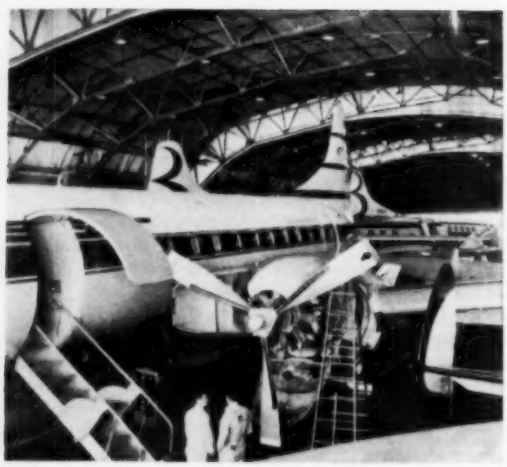
WHY BUSINESS PLANE TRAFFIC IS BOOMING AT

NEWARK AIR SERVICE

Bud Shoup (right), chief pilot for Buckeye Pipeline Company, discusses instrument installation with NAS manager, Guy D. Drake.

BUSINESS PLANE operators are patronizing Newark Airport in increased numbers as La Guardia's restricted facilities and the mounting air traffic in the New York control zone add as much as an hour to executive door-to-door air travel time.

Newark is a "natural" B-plane base. Its modern all-weather airport is situated in the western portion of the New York air traffic control area. It is often free of smoke-fog blankets and open to VFR landings when both Idlewild and La Guardia are operating under IFR conditions. It has less scheduled airline traffic than its sister Port Authority terminals, yet it possesses modern and essential terminal features.



NAS offers storage and shop services to 15 fleet operators. Engelhard Industries' Convair in foreground.

A Carey limousine and chauffeur await the arrival of an executive aircraft to whisk its occupants to business appointments in New York. Westinghouse F-27 and an NAS Aero Commander in background.

Mileagewise Newark is farther from 42nd Street than La Guardia but taxi or airport limousine time is about the same—20 to 25 minutes, and less than La Guardia in rush hours. This is due to the excellent parkway and tunnel system connecting Manhattan with the New Jersey airport's front door.

For planes coming to Newark from the south, southwest or west, saving in flight time over that required to fly over the city to enter the crowded pattern and to reach a ramp position at La Guardia is substantial—in time as well as in wear and tear upon crews and passengers. The La Guardia situation is aggravated further by delays and temporary restrictions due to runway and terminal improvement construction which will be in progress for more than a year.

Naturally, increased accent upon Newark Airport as a port for business aircraft is bound to turn the spotlight facilities for serving B-plane operators and their VIP passengers. After landing, the pilot has two choices; one is the New York Port Authority's own gate at the tip of the east loading wing. The other is Newark Air Service, a 25-year-old fixed base facility situated at the western end of the hangar line.

The PA gate is used for loading and unloading of passengers. Its staff collects landing fees and assigns parking stations. Newark Air Service provides these same services, of course, plus fuel, food, maintenance, operational and other essential services.

Interest in Newark Airport is being highlighted by a "Welcome" note mailed to business plane operators by Guy D. Drake, youthful and energetic manager of NAS. His invitation outlines the merits of the NAS-Newark combination in terms of "what it means to the man whose time is precious."

"I've talked so much with business plane crews about their battle to make on-time arrivals and departures in the New York area," he says, "that I feel we can help them save time and also ease the load on La Guardia and Idlewild."

Newark Air Service was purchased five years ago by Lehigh Warehouse Transportation Co., from C. J. Strickland, its former operator. The Lehigh firm is a closed stock company, in which the Drake brothers are principal owners. Guy's brother, C. William Drake, is president of the parent organization which owns and operates warehouses, bulk storage, canning, bottling, trucking and aircraft tire recapping businesses, in addition to the aircraft operations services.

"We bought into aviation," said Guy, "because we felt there would be a bright future servicing business aircraft operators."

Traffic growth at NAS has been excellent during the last four years. Income and traffic increase over the initial three-and-a-half-year period was 100 per cent; six months ago it tripled. The sudden rise was due to shifting of business to Newark to make way for La Guardia's reconstruction. The latter's overflow has also been felt at Westchester, at Bridgeport Airport in Connecticut and at Zahn's airport on Long Island.

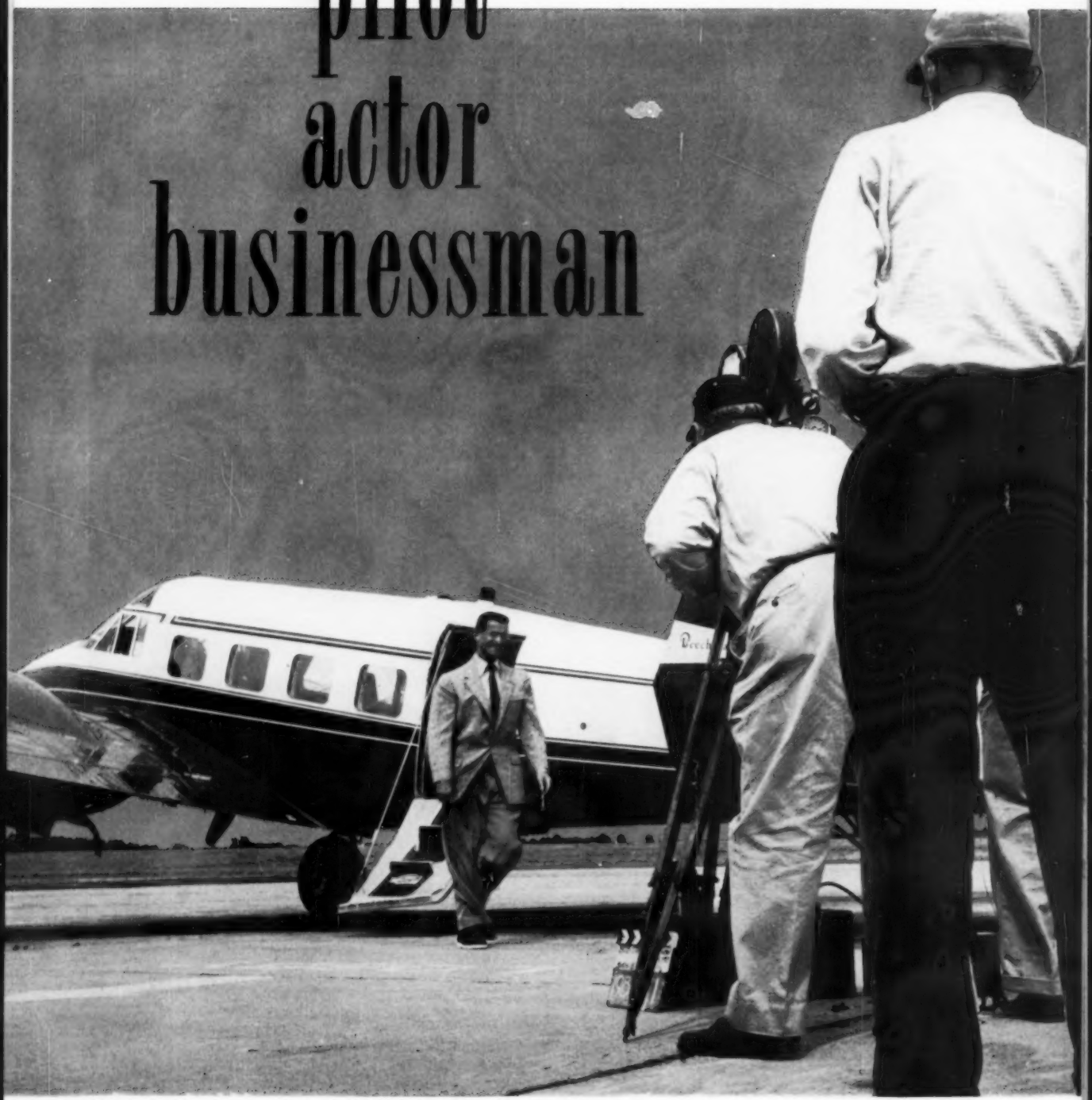
Daily executive plane traffic at NAS averages 50 planes over a seven-day week, including more than 200 air-crewmen and passengers.

Aside from fuel, oil and routine transient aircraft maintenance and servicing, NAS offers storage and shop services to 15 fleet operators who call NAS home. These tenants include ESSO tankers, AVCO, Engelhard Industries, the Javelin Co. and Pan Atlantic Steamship Co. Aircraft range from single-engine and light-twin types up to Convairs and a DC-4.

NAS provides shop maintenance to tenants and transients. It leases a portion of its (*Continued on page 76*)

MEET BOB CUMMINGS...

pilot actor businessman



Filming sequence for "The Bob Cummings Show."

America's first certificated civilian flight instructor, this well known Hollywood star, credits his success to a love of flying.

By JAMES R. GREENWOOD

IF ORVILLE WRIGHT hadn't contracted "barber's itch" one day, aviation might have passed Bob Cummings by. And if, in later years, Bob Cummings hadn't been so doggedly determined to learn all he could about airplanes and airmanship, it's conceivable that success on stage and screen might have eluded him, too.

For this breezy, bumptious film star's career has been a rich mixture of flying and acting—one complementing the other—ever since he first soloed an OX-5 Travel Air biplane March 3, 1927.

Bob Cummings still considers flying his main interest in life next to family, and acting but a means to an end A highly proficient pilot with multi-engine, instrument and instructor ratings, he has operated a flying service, owned an airline and taught scores of students to fly. In fact, he holds the first Federal flight instructor's rating ever issued!

He's an honorary colonel in the California Air National Guard, a 19-year veteran of the Los Angeles County sheriff's air patrol, and so far has amassed over 5,000 pilot hours.

Today, through television and public appearances, he is making the role of civil and military airpower more meaningful to millions of Americans. Remember his national TV pitch on behalf of general aviation at the World Congress of Flight in Las Vegas last April? More recently, he and his oldest son, Robert Richard, 14, were featured together in a special TV show about the U. S. Air Force Academy.

In these activities Bob's basic objective is to help "sell aviation as a way of life." Though appalled by some of the younger generation's obvious indifference to flying, he doesn't believe that a formal aviation education program in our public school system would do much to solve the problem.

"Education follows inspiration," he says. "Properly motivated at the grass roots level—in the home—our youth would be eager to learn. And we must also encourage more adults to fly by removing some of the financial barriers."

Much has been said about Bob Cummings, the actor, but little about the extent of his flying. Granted, there are many cinema celebrities who fly—Robert Taylor, Dick Powell, Robert Young, James Stewart and Edgar Bergen, to name a few. But to Bob Cummings flying is indispensable—"a way of life."

In his early movie-making days, for example, he commuted to location sites in a Porterfield almost daily. Later he flew various types of planes all over the U. S. to exploit his pictures.

Now he owns a Beechcraft Super 18 executive transport. Before he bought it in 1956, Bob owned and flew a Beechcraft Model 18 for nine years.

Mary Cummings is president of the couple's television production company and manages all the business, including investments. "One trip in particular a few years ago sold Mary on the value of operating our own airplane," says Bob. "We criss-crossed the country like driving your car, only so much faster and far more comfortably."

Cummings served as an AAF flight instructor during WWII. Here, seated on wheel of a Boeing Kaydet, he briefs student, Harold J. Kirkwood.

First they flew to Albuquerque to confer with business associates, then to Fort Worth where Cummings made a speech. Next to appointments in Bob's home town of Joplin, Mo., and from there to meetings in Fort Scott and Kansas City. Then they flew on to Fayetteville, Ark., for a library ceremony, back to Oklahoma City to negotiate oil leases, next to Clemson, S. C., to see Mary's brother graduate from college, and finally to Winston-Salem to visit their sponsor's cigarette factory.

Bob was back in the studio in less than five days!

Besides using his Beechcraft for business trips, Cummings featured the Super 18 on his award-winning TV series called "The Bob Cummings Show"—the laugh-provoking comedy about bachelor-photographer "Bob Collins" who likes flying and pretty girls, not necessarily in that order. Following an enormously successful five-year run, the show was sold last year for some $4 million in one of the most fabulous deals the industry had ever seen.

The whole idea of writing scripts around an aviation theme was Bob's. (Example of the dialogue: in one episode nephew Chuck, played by Dwayne Hickman,

describes the Super to a friend. "How many will it hold?" asks the friend. "Uncle Bob and seven models," says Chuck.) Cummings used his own plane for filming outdoor sequences; studio shots were made with a cabin mockup provided by Beech Aircraft Corp.

In addition to starring in the weekly show, Bob directed and helped produce it. When not rehearsing, shooting or recording, he was off somewhere making a personal appeal on behalf of a worthy charity, adding another award to his huge collection of honors or promoting his number one product—entertainment. His other interests include the Cummings Foundation for Nutritional Research, oil properties in Oklahoma, Texas, Nebraska and Canada, and a new motel in Joplin, an enormous rice plantation of 1,500,000 acres in Darwin, Australia, and a 2,500-acre sheep station in Esperance, Australia.

Mrs. O. A. Beech beams as Bob Cummings signs check for his Beechcraft Super 18 purchased in 1956.

Cummings' oldest son, Robert Richard, 14, shows great promise as a pilot and will solo as soon as he reaches 16.

Such heavy demands on a star's time are all part of the profession, but Cummings emphasizes that important engagements away from the studio would be few and far between if he had to rely on commercial transportation. When his program switched networks, Bob and sponsors planned a whirlwind six-day promotional tour of eight key cities. At the time, Bob's plane was tied up.

"We were in a spot," he recalls, "but thanks to Olive Ann Beech who graciously lent us the use of her personal Super 18, we were able to fulfill all commitments."

All eight cities were visited right on schedule—a hectic itinerary considering that Cummings devoted much time to interviews and flying local TV editors around in the Beechcraft.

Over six feet tall with blue eyes and close-cropped brown hair, Bob Cummings has the vitality of a man half his age. His boyish, athletic appearance belies the fact he's now 50—happily married and the father of five attractive children. In private life the family takes to the air as often as work permits. Robert Richard, an honor student at Black Fox Military Institute, already shows great promise as a pilot. He's capable of making supervised take-offs and landings; he plans to solo on his 16th birthday.

Robert O. Cummings, as he signs contracts, has one of the liveliest minds in Hollywood. His real-life dialogue flows as refreshingly as any ever written for him. Whether romance, acting, flying, politics, dogs, diets or himself, he can discuss them all intelligently and convincingly, and has a positive, pungent theory on each. But he prefers aviation to any other topic, especially to women.

"It's safer," he says. "After all, there are only about 2,000 things you must know about a plane and you can consider yourself a fair authority."

A smooth, parlor-type comedian in both movies and TV—but equally accomplished as a dramatic actor—Bob is, like many funny guys, a serious fellow off camera. Having made an extensive study of correct eating habits, he's an expert on nutrition and has even been asked to write a book on the subject. He takes countless vitamins, stressing that both flying and acting depend upon good health.

Several years ago nutritional consultant Leo Rhodifer, then 52, asked Cummings if a man in his 50s was too old to learn how to fly. "Of course not," replied Bob. "Why wait 'til you're 70—the price of gas may be double!" Rhodifer now has a commercial license.

Actually, it all started for Bob Cummings some months before his birth in 1910 in Joplin. His father, the late Dr. Charles C. Cummings, a physician and surgeon, had treated Orville Wright for barber's itch, a facial fungus which the pioneer airman picked up in a Kansas tonsorial parlor while en route to Joplin with brother Wilbur. One of the first practitioners to employ ultraviolet rays in treating skin diseases, Dr. Cummings quickly cured Orville's infection and the two men became good friends.

Bob's parents were so impressed by the Wright brothers and their faith in the future of the "flying machine" that Dr. Cummings was moved to launch a one-man crusade for local airport development—even though few people around Joplin at the time had ever seen an airplane. Moreover, the good doctor vowed that his first child, if a son, would be Orville's namesake. Thus, when infant Bob arrived, he was named Charles Clarence Robert Orville Cummings—the Orville in honor of Orville Wright!

This airminded parental influence manifested itself early in the actor's childhood. Dr. Cummings would relate stories of the Wrights' adventures; he helped his son build model planes and took the boy to a nearby golf course to watch the real ones fly. By the time Bob entered Joplin High he had made up his mind to become an aeronautical engineer. Then one day a local plumber named Cooper brought to the school's auto mechanics class an OX-5 engine long overdue for an overhaul.

"Cooper wasn't much of a motor mechanic," Bob recalls, "but he fixed a great toilet."

Cummings and his classmates majored the engine and in payment each received a free airplane ride. Soon young Bob was spending all his spare time and earnings as a drugstore "soda squirt" on 15-minute flying lessons at the going rate of $25 an hour. "Cooper could fly a kitchen sink if he had to," says Bob, "but he was non-talkative—like Lindbergh, the silent, lone eagle type. I learned by trial and error, mostly error."

By March 3, 1927, Cummings had accumulated the grand total of three hours and 15 minutes of so-called dual instruction. That afternoon Cooper, unable to meet Bob for a scheduled lesson, told his 17-year-old pupil to "take her up alone, you're ready." Not (*Continued on page* 54)

THE PRO'S NEST

Always be sure to drain wing tank sumps as part of the pre-flight check.

Commonly attributed to "carburetor ice," sudden engine stoppages may be due to an easily preventable situation.

SOME FACTS ABOUT FUEL CONTAMINATION!

By V. A. FOSTER

IT ALL BEGAN one day out in the middle west with the president of an insurance company watching a pilot complete a pre-flight check of a popular make, high-wing monoplane. The pilot drained about a pop bottle full of clear gasoline from the sediment bowl. "There," he said with satisfaction, "Now I *know* there's no water!"

The insurance executive waved a hand as the pilot taxied out for take-off. Suddenly, just before the plane pulled out on the take-off runway, the engine quit cold. Examination, with the insurance president an interested onlooker, showed the sediment bowl *full of water!*

The executive, himself a pilot for over 27 years, with constant and varied flying experience, went home that night mulling over this seemingly inconsistent occurrence. The lowest point in that aircraft's fuel system had been drained, more than a usual amount of fuel removed, to check for contamination. Water *was* the heavier liquid, wasn't it? When combined with gasoline, water invariably sank to the bottom, the lowest point in any container? It had to. And yet—for some reason, water in the fuel system of the aircraft he had just watched—had not obeyed this common, scientific precept.

For some time he had not felt satisfied over the common explanation of sudden engine stoppages, "carburetor ice." This, he knew, causes a gradual loss of rpm, manifold pressure, accompanied by engine roughness. Seldom does a smoothly running engine suddenly gulp, sputter and die due to icing.

There are approximately 600 major accidents due to engine stoppage each year, a look at the FAA statistical handbook reveals. Pilots experiencing sudden, unexpected engine stoppage must often land in highly unsuitable areas, frequently demolishing their aircraft. Engine failure on take-off presents the pilot with an even more hazardous problem.

While good initial design, close quality control and conscientious maintenance have reduced engine stoppage to a "once in every 300 years" occurrence; it still does happen occasionally though. Pilot error—failure to switch tanks, failure to carry adequate fuel, wrong selector setting, inadequate estimates of fuel consumption—for a large percentage of it. Actual failure of the engine itself is a rare occasion today.

The executive went home, (*Continued on page* 70)

FIG 1.

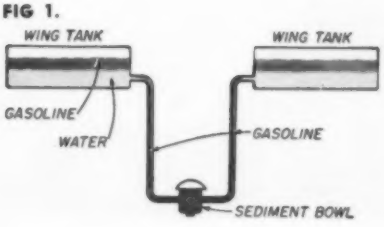


FIG. 2.

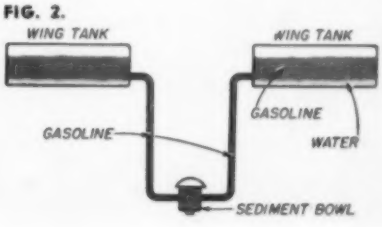
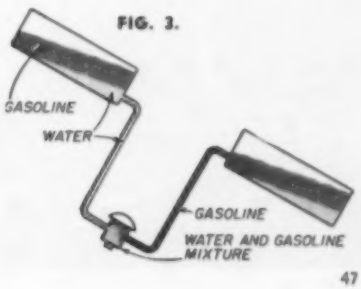


FIG. 3.



AERO COMMANDER 500

IF THE MANUFACTURERS of the Aero Commander had no other claim to fame, the fact that they designed, built and went into successful production of a commercial type aircraft after World War II should be enough.

In a business where it's notably tough to stay alive, Aero Design and Engineering Company is not only alive but kicking pretty lustily. To the best of my knowledge it is the only postwar producer of business aircraft which has managed to become a factor in the field.

A lot of people must be happy that Aero Commander persevered against all obstacles, for there are more than 850 of these airplanes flying all over the world. Most notable, of course, and of which Aero Design is understandably proud, is that the plane was picked for President Eisenhower's personal use.

I had a sense of anticipation as I walked along the ramp with Jack Rector, Aero Design's Director of Public Relations, and Bill Doler, Sales Pilot, to try my first flight in the Aero Commander 500. The long, high wing, the gracefully sweptback vertical stabilizer, and the more than usual dihedral of the horizontal stabilizer were all done up in shining white with flashy red and blue trim. All in all, it made a mighty tasty looking package.

This model is the low end of the Aero Commander series. Although to the unpracticed eye it looks like all the others, it is the lowest priced—$64,750 f.a.f. and the lowest powered, mounting two Lycoming 0-540-A2Bs rated at 250 hp each swinging two-bladed, full-feathering propellers which are the hallmark of the model.

Entering the Aero Commander brought out its first feature. You just open the door and step in. While not fabulous, the interior of the 500 is certainly nothing to be ashamed of. A deep pile carpeting covers the entire floor area, the upholstery is fully the equal if not better than that which you'd expect to find in the better automobiles, and the padded sidewalls and tasteful headlining give an overall feeling of luxury.

Pilot, co-pilot, and the two passengers immediately behind them sit in individual seats. They are adjustable

fore and aft and can also be rocked back into a semi-reclining position. The rear seats can be individual or, as optional equipment, bench type. While it normally accommodates two people, three can be squeezed in to make the 500 a seven-passenger aircraft. A lounge can be made up by turning the two middle seats around to face backward. The rear bench seat is then moved forward and the back folded to a horizontal position, creating a full length lounge on which you can recline with the greatest of ease.

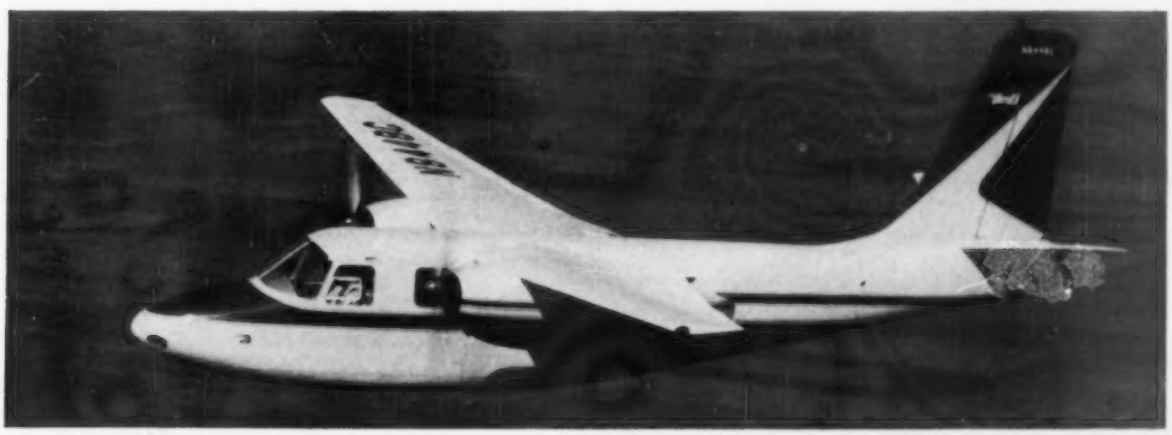
Getting into the pilot's seat and taking a first look around, you are immediately impressed with the wonderful visibility to the sides and ahead. As a matter of fact, you sit so far forward in the nose the runway is visible as close as four or five feet. Your next impression is that of sitting extremely close to the ground. But in a few minutes you become accustomed to it and fall in love with this low sitting position.

The instrument panel has an uncluttered look that inspires confidence. On the left side are the flight instruments; on the right half are the engine instruments, gear and flap and fuel indicators, ammeters and hydraulic pressure gauges. All the switches have been moved to an overhead panel which is divided into three sections with a left panel containing the master switches, exterior light switches and left engine switches. On the right panel are the right engine switches, cabin heater and blower, pitot heat and radio switches. Between the two is a center panel on which are located the elevator and rudder trim tabs plus interior light switches and rheostats. My first feeling was that I would not like this overhead arrangement. However, after using it only a few times, I found it to be quite convenient. In addition, the cockpit check before starting procedure is simplified because you start at the left side of the panel and just go across, checking each of the proper switches. I also found the trim tabs convenient to use.

The Lycomings had not had a chance to become cold after the flight from Oklahoma City to my home field at Wichita, Kan., and fired readily *{Continued on page 64}*

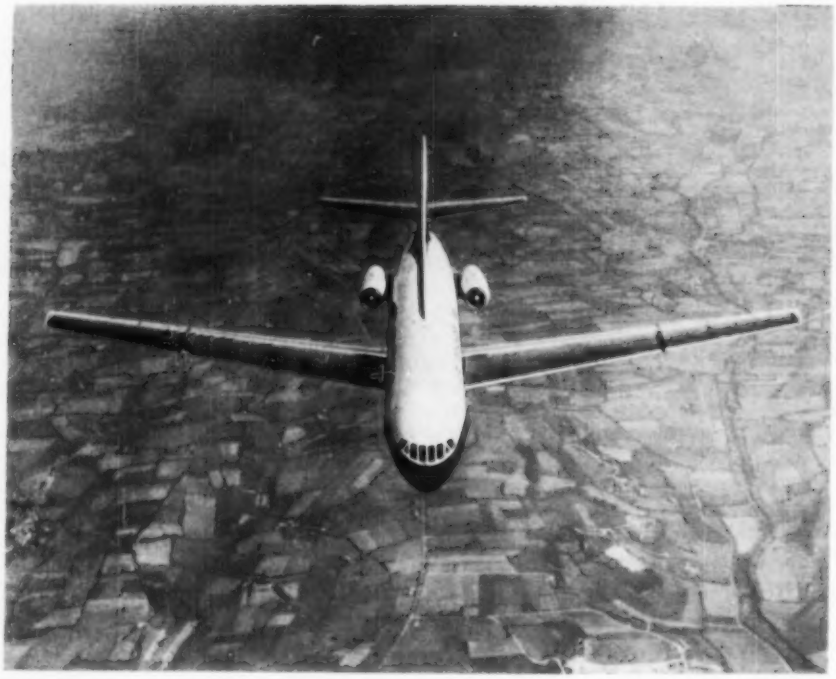
CHECK PILOT REPORT on Aero Design's latest model of a popular light twin.

By NORMAN JACOBSHAGEN



Above: The model 500 has graceful lines of all Aero Commanders. Below: Six/seven passenger interior and uncluttered instrument panel.

FLYING NEWSREEL



CARAVELLE. Right: The highly successful French medium range twin jet airliner now in service with several foreign airlines, shows its clean configuration in this unusual view. Sud-Aviation, builders of Caravelle, have over 50 on order. It is reported that at least one U.S. carrier is seriously considering using the jetliner on shorter routes. In addition, several U.S. aircraft manufacturers have expressed interest in building the Caravelle here.

LOOKING IT OVER. Below: A McDonnell F3H-2M Demon, Navy Fighter armed with Sparrow III guided missiles, keeps a wary eye on a Ryan KDA Firebee target drone. The translucent look of the drone is due to its fluorescent paint job which makes it visible in the air and on the ground.

FLETCHER Fu-24. Below: Rare bird in the United States, this agricultural plane, built by Fletcher Aviation Corp., Rosemead, Calif., is popular in New Zealand, where 100 are being assembled from prefabricated components shipped from U.S.A. Span 42 feet, power, 240-hp Continental.

FLYING NEWSREEL

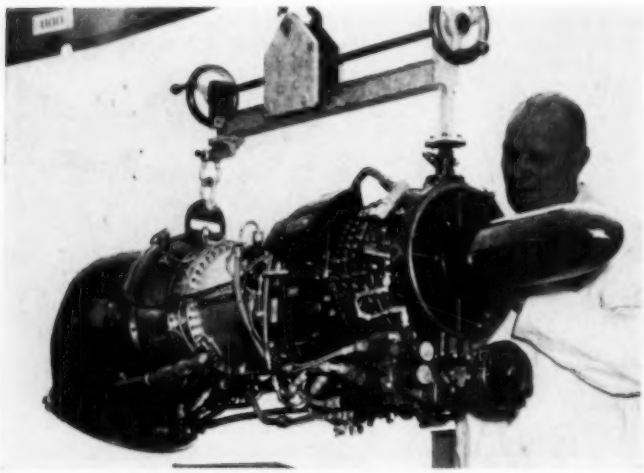
AERO-PLANE. Right: Though outwardly identical to the roadable Aerocar, the latest product of the Longview, Wash., firm is strictly an airplane. Removal of car components permits the new model to carry four passengers. Like Aerocar, plane features folding wings, is powered by 143 hp Lycoming engine.

JET TRAINER. Below: Two-place side-by-side light jet designed and built by Canadair, Ltd., of Montreal, Canada. With top speed of 412 knots, the CL-41 stalls at only 62 knots. Power is provided by Canadian designed, U.S. built Pratt & Whitney JT-12 rated at 2,400 pounds of thrust.

NEW YORK AIRWAYS will introduce in 1961 the Vertol 107 twin turbine helicopters on its routes. The 25 passenger 'copters will enable NYA to increase its present passenger capabilities by as much as 400 per cent. Model 107 has a top speed of 162 mph. Total order is for 10 Vertols.

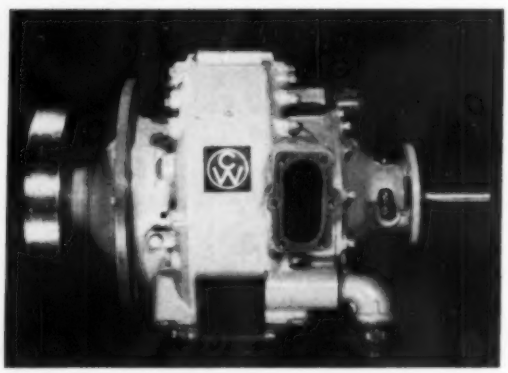
FLYING NEWSREEL

BOEING 720. Right: Smaller version of the famous 707-120, this latest Boeing jetliner, designed specifically for medium range routes, can accommodate 90 to 150 passengers and is 45,000 pounds lighter than the 120. Plane features increased wing sweep between fuselage and inboard engines for higher speed capabilities and low speed wing lift. United Airlines ordered 18 for delivery in April. American Airlines, 25.

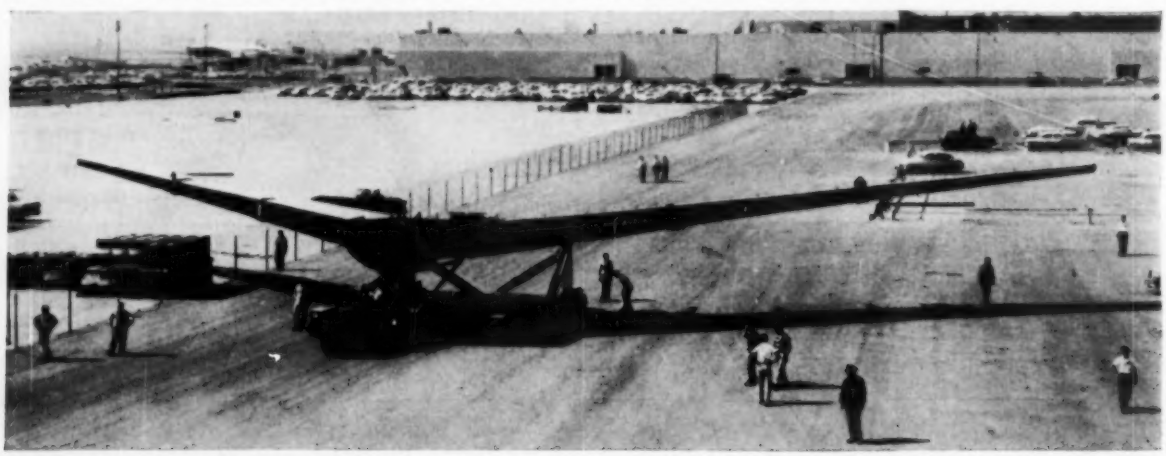


CT58-100. Above: Commercial counterpart of the military General Electric T58-6 turboshaft engine is first turbine to be authorized by FAA for commercial helicopter service. The engine is rated at 1,050 shp.

ROTOR ENGINE. Below: With only three moving parts, this engine may turn out to be a revolution in reciprocating powerplants. Normal cycle is carried out in a circular path, a complex shaped rotor and a stator taking place of piston. Fuel mixture is delivered by standard carburetor. Originally developed by NSU in Germany, the engine will be built and further developed here by Curtiss-Wright for aircraft and other uses ranging from 100 to 5,000 hp.



WING TANK. The huge, wing-like structure below holds the life blood of the Douglas DC-8. The integral tank, a box beam section of the wing has a capacity of 17,600 gallons, is rendered leakproof by injecting Thiokol polysulfide sealant with special air gun. Process is similar to caulking.



NO. 238

I learned about flying from that!

Torn from the sky by a 230-knot jet stream which took him by surprise, an experienced sailplane pilot discovers a little known facet of the weather.

By JOE GREENBAUM

DURING THE TWO YEARS prior to the decision to locate the United States Air Force Academy at its present site, the Denver Soaring Club, of which I am a member, used Pine Valley Airport to soar from in their sailplane. The airport was located on the southern edge of the land now occupied by the Air Academy, about 15 miles north of Colorado Springs, Colo. We were fortunate in being permitted by the operator to conduct winch launching operations on the field, as not every airport manager is aware of the safety of soaring and the profitable public interest that is generated wherever gliders are flying regularly. Also, at this field we had the use of an excellent winch built by the eminent Colorado Springs architect and general contractor, David C. Johnson, to launch his Laister-Kauffman sailplane. His brother, Dick Johnson, holds the 535-mile International Distance Record for gliders.

At the time I had been soaring for five years, having about 150 hours in sailplanes, most of this time in the machine owned by the Denver Soaring Club. This ship is a war surplus training glider designated at TG-3, built by the Schweizer Aircraft Company of Elmira, N. Y. It is a safe and easy-to-fly machine without any vicious characteristics, though moderately heavy on aileron force requirements. However, it was neither the ship nor my inexperience that nearly wrote the end to my flying career. My enemy was an old Nemesis of pilots, the weather. A little known facet of the weather. I was to learn this day that downdrafts sometimes do go right down to the ground —steady down in excess of 3,000 feet per minute, right down to the grass.

The warm, sunny, blue-sky day raised hopes of another fine flight like one on the previous week end when we reached 17,875 feet altitude in a thermal at five o'clock in the afternoon. A jet stream was predicted for this afternoon, moving at nearly 200 knots and dipping as low as 12,000 feet at times. Pilots who fly near the mountains have read and heard much about the lee wave conditions associated with high winds and mountains. There is, usually, a visible rotor cloud in the lee of the peaks and, high above the rotor, a typical lenticular cloud forms, glistening white in stationary splendor.

On this day there was no sign of a rotor nor a lenticular. I assumed, along with every one else, that the jet stream prediction was in error in the best Weather Bureau tradition. During the earlier tows made by other club members one of the regular spectators, who had expressed considerable intelligent interest in the operation, approached me. He thought it would be a good day to try a soaring ride. "For my first flight in a glider I think I will enjoy it more if it is smooth and routine." I agreed with this, of course, having had some experience with airsick passengers who always wanted to land when the thermal was kicking us up at 1,200 fpm plus.

I briefed him on procedures and, as the ship approached the field from a short soaring ride, adjusted his parachute harness and told him how to use it if required. We rode to the glider in the tow car and soon had it back into position for take-off at the north end of the field.

After a quick check of the plane and the cockpit, the canopy was closed and we were hooked up to the tow cable. The man holding the wings level signalled the winch to take out the cable slack by waving the wings up and down and, when the slack was out of the wire, levelled them to signal the start of the tow.

The wire suddenly swept out perfectly straight as it pulled over a low mound in front of the ship and, releasing the brake, we were swiftly rolling. The ship was airborne in less than 50 feet and I eased her into the climb that is characteristic of winch launching. The early part of the tow appears incredibly steep to the uninitiated. After the first third of the tow the down pull of the wire begins to overcome the available up elevator and the climb is reduced gradually until the top of the tow, the winch operator slacking the power as the ship nears the top of its climb.

I pulled the tow cable release at 1,100 feet and the variometer (sensitive rate of climb indicator) indicated an increasing 300 feet per minute climb. A 40-degree banked turn to the right resulted in the variometer moving down a little on the part of our turn toward the foothills so I tightened the bank there and leveled out for a few seconds when we were pointed toward the eastern plains. Sure enough, the stronger part of the thermal lay in that direction and, by the time we completed the next 360, we were soaring in a booming 500 fpm thermal.

In four minutes we were at 3,000 above the field but then the inexplicable happened. The ship flew out the side of the thermal and I dropped the nose sharply to prevent a stall in the down draft surrounding the thermal core. We leveled off and then turned upwind to seek out the lift again. My passenger cried, "Where did it go? I thought you had it centered perfectly."

"So did I. But that's soaring. (*Continued on page 79*)

Meet Bob Cummings

(Continued from page 46)

one to dispute his mentor's judgment, Cummings mustered all his nerve, propped the OX and after a couple of taxi runs lifted the Travel Air off. A few weeks later he flew his first passenger, his mother.

"Dad was furious," says Bob. "He thought piloting a plane was great for everyone but me. Mother, on the other hand, urged me to continue my training."

Cummings racked up a lot of hours around Joplin, hopping passengers (for hamburgers), flying charter (for peanuts) and delivering airplanes (for fun). He once ferried a Tri-motor Ford on one engine, the two outboard powerplants having been shipped on ahead by rail. "Probably to save fuel," he quips. Then in 1929 he packed off for Carnegie Tech in Pittsburgh to study mechanical engineering as the first step toward a degree in aeronautics.

In Pittsburgh he flew as often as his pocketbook allowed, mostly in a rented Curtiss Pusher. The crash of '29 was upon us and, seeking ways to earn more money to eat and for flying time, he succumbed to roommate Frank Crenshaw's tales of golden opportunities in the theater, quit college and enrolled in the New York Academy of Dramatic Arts. For this he was paid $14 a week; the academy at the time happened to be in dire need of male students.

To supplement his "income" Bob drove cabs, ran elevators and hawked tickets to flopping plays. Six months later, he completed the academy's "Junior Course" and struck out on his own. But at the time Broadway was undergoing a British cycle and all his efforts proved fruitless. Nearly broke, he cashed a life insurance policy, took the $680 it provided and sailed for England to acquire the proper inflections.

"I stayed a month," says Bob, "just long enough to cultivate a British accent and write letters to top producers. I told them I was the youngest actor-director-producer-author in England, that I was coming to America and would consider any suitable offer. I signed the letters 'Blade Stanhope Conway.'"

Back in New York he had several parts waiting, selecting "The Roof" for his Broadway debut. A succession of increasingly important roles followed, climaxed by a lead in the Ziegfeld Follies, with Fannie Brice. Still masquerading as the celebrated English actor B. S. Conway, he kept up his flying in nearby Flushing.

Eventually he wound up in Hollywood, but by then the British vogue had died. Finding no market for English talent, he became Bob Cummings and transformed himself into a native Texan overnight to land the lead in "So Red the Rose," his first movie.

Still pursuing an active part in aviation, Bob studied hard, worked hard and continued to build up flight time. His fierce drive for perfection as an actor had a singleness of purpose: more lucrative film roles would mean more flying. Then in 1936 he became a partner with Charlie Osborne and Dwight Peterson, now a Federal Aviation Agency official, in the operation of Peterson Flying Service at Mines Field, Calif. They offered aircraft maintenance, charter, storage, line service, wallets, wings, log books, goggles, and flight training.

"Even at $3.50 dual and $3 solo, we had nothing going but the rent," Bob reflects.

Cummings himself instructed a number of other film folk, among them Art Linkletter, Sonja Henie, Laraine Day, Marsha Hunt, Joan Leslie, Deanna Durbin and Bill Lundigan. He flew Porterfields, Taylor Cubs, Airmasters, Arrow Sports and a wide variety of other types. At the dedication of Cummings Field—a Lindsay, Calif., airport named in his honor—he performed aerobatics in a Parakeet, along with the late Tex Rankin, a close friend.

One day in 1938, while contemplating the fate of the fixed-base business in general, Cummings was approached with an opportunity to buy a healthy chunk of Mines Field for $40,000. Although he had a few bucks salted away, he didn't have that kind of money, so he rejected the proposition. Today the property is site of Los Angeles International Airport. But to top it off, later that same day a David R. Davis failed to induce Cummings to invest in a radically new wing design. Now Bob winces every time he sees a low-drag Davis wing.

Also in 1938 the CAA, aware that many people who could fly were actually incapable of teaching the art, created the rating of flight instructor. Bob applied for the rating even before Washington had prepared an examination. As a result, the Los Angeles CAA inspector, Gene Scroggy drafted a tough ten-hour written, which Bob passed. After a thorough flight test, he qualified for Flight Instructor Certificate number "one" by virtue of the fact he had been the first pilot in the country to apply!

Business was so bad though that the partners decided to sell out. Little did they realize that within a few months the CAA would announce its Civilian Pilot Training Program (CPTP), forerunner of military contract schools, which was to give an economic shot-in-the-arm to many of the nation's struggling fixed-base operators. But back in those days missing a good thing seemed to be standard procedure for Charles Clarence Robert Orville Cummings.

With the world ablaze, his producers said, "Let's make pictures."

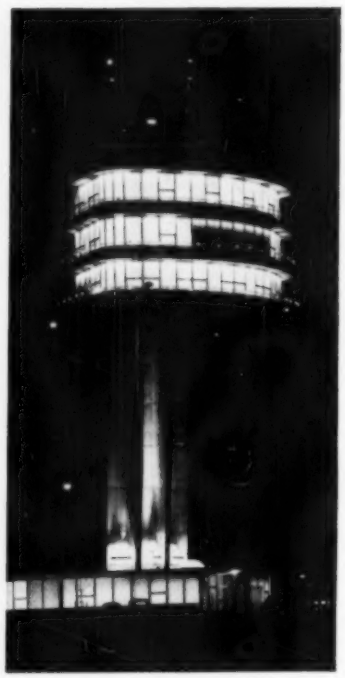
Cummings replied, "Let's win a war." Rejected for combat pilot training on grounds of age, Bob helped organize one of California's first Civil Air Patrol squadrons, which he subsequently commanded. He instructed, flew patrol missions and, as a CAP courier, carried priority freight and mail. He also found time somehow to star in "Princess O'Rourke"—the story of an airline pilot.

Cummings worked on the Princess set by day and boned up on navigation, engineering, meteorology and code by night. It was an exhausting schedule and Bob managed to complete the picture purely by dead reckoning. He would look into the eyes of his leading lady, Olivia de Havilland, as if they were the dreamy depths of an altimeter. It got so that director Norman Krasna would call "contact" instead of "action" to get Cummings on the scene. Sometimes he was so tired he couldn't even find the sound stage.

Though he enjoyed playing Eddie O'Rourke, this movie was a good example (another was "Border Flight") of Bob's pet peeve—the lack of authenticity in Hollywood make-believe aviation. A stickler for realism, he raised violent but useless objections to certain scenes, such as showing the captain in the right seat of a DC-3 and both crewmen wearing full uniform for all cockpit shots. "How many airline pilots fly with their coats and hats on, unless the heater's busted?", he asks.

Bent on a bigger role in the war effort, Bob shelved his film career temporarily to become a $250-a-month flight instructor in the contract training program. To do this he resigned from CAP, then enlisted as a private in the Army Air Forces reserve—though he held an officer's rank in the field. He instructed primary and

(Continued on page 56)



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(Continued from page 54)

basic at three of Maj. C. C. Moseley's AAF flight academies in California.

Cummings graduated dozens of military pilots, many of whom went on to distinguish themselves in combat. Canada gave him an Air Safety Award for soloing 94 students—83 went overseas—11 decorated—none injured—none killed—none involved in a serious accident!

Safety, incidentally, is not only a heritage in the Cummings household, it's a cardinal rule. Interestingly, his father may have been one of the first persons to equip a passenger car with seat belts. He installed them in his 1911 Ford after a painful collision with a horse-drawn lumber wagon. Bob has put belts in every auto he has owned, and he insists that every member of the family buckle down no matter how short or long the trip.

During the war Cummings also toured the U. S. selling bonds and on occasion ferried bomber-trainers from factories in Wichita to Fargo, N. D. Near the close of hostilities in 1945 he transferred to Muroc flight test center, now Edwards Air Force Base, then under command of Col. Clarence A. Shoop. Now Major General Shoop and head of the California Air National Guard, "Shoopy" is often seen in person on "The Bob Cummings Show." He credits the TV series with having done more to stimulate interest in the air guard movement than any other single vehicle.

At Muroc, Cummings qualified in just about everything on the base and in turn checked out other pilots. Flying entertainers to Muroc in a C-47 one day, Bob met and fell in love with actress Mary Elliott. They were married March 3, 1945 (the 18th anniversary of his first solo) in historic St. Francis Flyers' Chapel in Mission Inn at Riverside, Calif. Bob's mother, the Rev. Ruth Kraft Cummings, an ordained minister, performed the ceremony.

In keeping with tradition, Cummings' signature now appears on bronze wings hanging on the chapel wall, along with those of other famous fliers who have visited Mission Inn, among them Jimmy Doolittle, Amelia Earhart and Hap Arnold. Shortly after the wedding he began work on "You Came Along" with Lizabeth Scott, a story of military flyers and a national bond tour. In the picture he "marries" Miss Scott in an exact replica of the world-renowned chapel.

Following the war, in December, 1945, he and Gilman Shelton established Great Circle Airlines with a "fleet" of two weary UC-78 Bobcats. "Our first ship had a real fine electrical system," he recalls, "every four miles a fire." The venture ended in a cloud of balky engines, declining revenues and the total loss of one of their airplanes which happened to be parked in line with a wayward student's first solo take-off.

Bob had nursed an ambition to own a Beechcraft ever since the day he first saw a Model 17 negative stagger-wing cabin biplane in the early 1930s. This desire grew stronger while doing some C-45 flying in a movie. His long ambition was realized in 1947 with purchase of a $34,000 converted Beechcraft C-45. A year earlier he had formed his own independent company, United California Productions, and the new plane was used to contact exhibitors and scout locations for the firm's movies.

Cummings entered television in 1952 as star of the "My Hero" series, which ran for two years. Then in 1954, in partnership with writer Paul Henning and George Burns, he made a pilot film of "The Bob Cummings Show" and sold it to the first sponsor who looked at it.

He invented the "Grandpa" bit to get more flying and more Air National Guard into the show. Unable to locate an operable JN-4D at a realistic price, he bought an old Fairchild 21 biplane for $900 and modified it to make the plane look older than it was. His sponsor protested, contending that the improbability of "grandpa" flying an antique would cheapen the program. But grandpa, also played by Cummings, drew more fan mail than any other situation, including those featuring some of Hollywood's most beautiful girls.

Bob's now busy writing the format of a new TV series built around a fixed-base

Bob Cummings and his family, left to right, Bob, Robby, Laurel Ann, Anthony Bob, Mary Cummings, Sharon Patricia, and Mary Melinda.

operation in a desert setting. Much of the material will stem from his own experience. It'll be light comedy, laced with mystery and intrigue. "And plenty of flying," Cummings adds.

"Before the war private flying was on the verge of metamorphose," he says. "Then boom—the war—and we skipped an era. I'm trying to fill a gap in the story of civil aviation progress."

Why doesn't Hollywood make more movies about flying? For the simple reason too few people in filmland fully understand or appreciate aviation, Cummings explains. "Writers, producers and directors won't tackle anything they don't comprehend. Also, there are few suitable, authentic mockups of modern aircraft available—and the cost of constructing them is generally prohibitive."

Like most airmen of long experience, he has few words of advice for future pilots. "Don't take aviation lightly and always strive to fly as professionally as possible. I look on flying as a business, just as I do my acting. Above all, don't take chances with Mother Nature—she's too unforgiving!"

As we said, there are lots of actors who happen to fly, but Bob Cummings is a flyer who happened to be able to act. END

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Houston, Tex.	Enterprise	302	St. Paul, Minn.	Zenith	6789
Indianapolis, Ind.	Enterprise	8030	Spokane, Wash.	Zenith	3000
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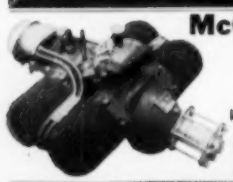

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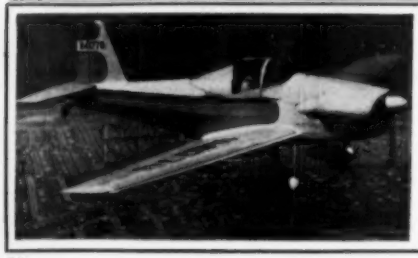

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Piper

(Continued from page 39)

ground time on every airline trip, including at least 20 minutes' early arrival at airport, delays in departure, waiting for baggage and reconfirming reservations, etc. In addition, business men should, realistically, allow time for other ground delays, such as those trips requiring change of planes, time on local airline runs involving numerous stops, and instances where connecting airlines use different airports. Such ground delays cut average airliner speeds to 215 mph or less, based on elapsed time.

The Piper study does not attempt to make hard and fast estimates for detailed use by company owners. Through the use of general formulae, each salesman can work out true cost estimates with each prospect to suit individual circumstances and conditions.

General reaction by aviation sales executives who are using the study is that it is complete and specific, explaining conservatively how company plane costs apply to a wide range of business applications. Piper salesmen add that the complete presentation has been especially effective within a company. Champions of company aircraft within an organization use it to sell their own management.

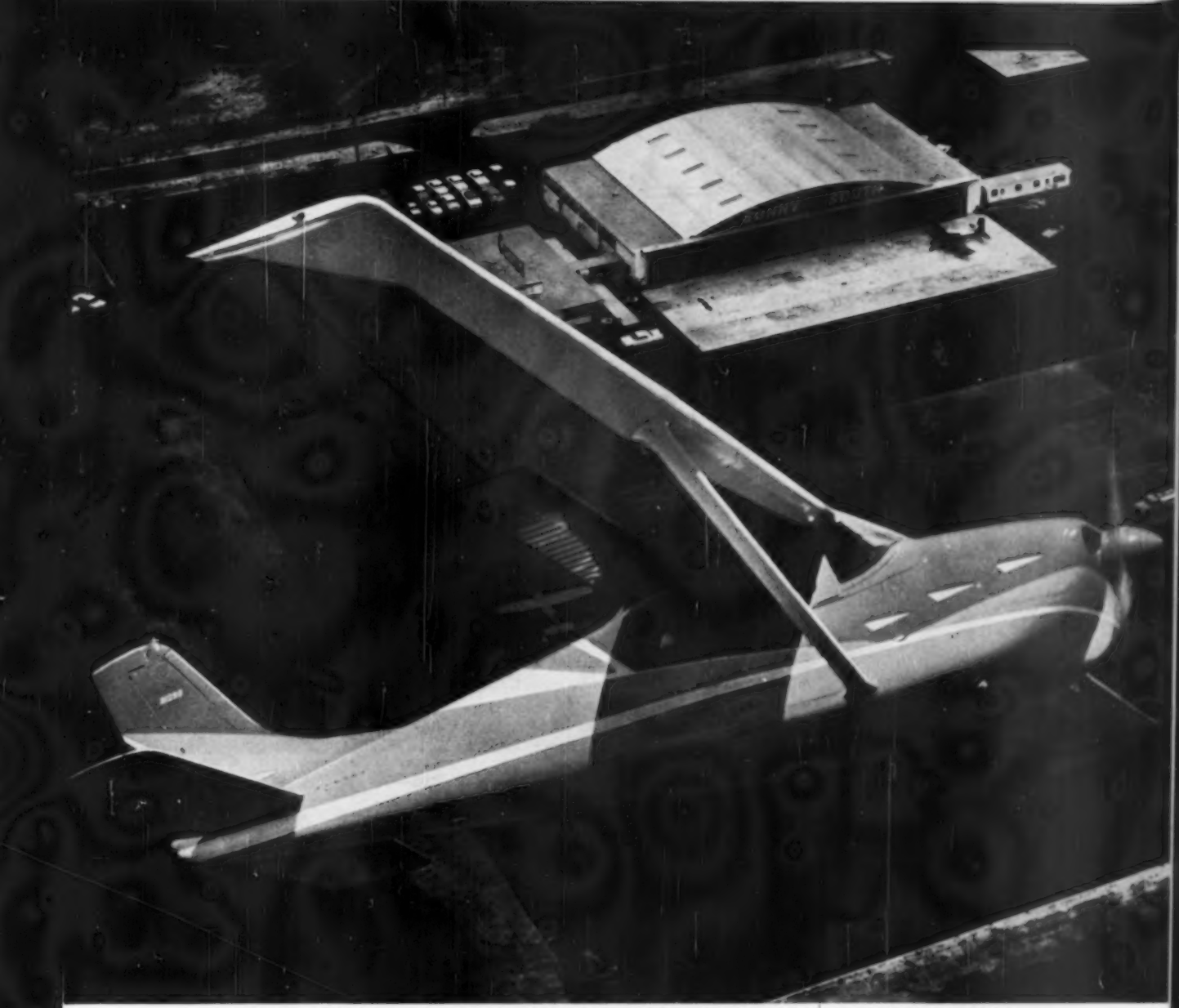
The 600 distributors and dealers—including foreign and domestic—for Piper aircraft sold 2,600 aircraft in 1959, of which 280 were twin-engined types. Company sales officials estimate that '60 sales will increase by as much as 40 per cent.

General Sales Manager Jake Miller and Assistant Sales Manager Wally Smith, both ardent sponsors of the factual approach to company sales, believe the Connelly study will prove to be a forceful instrument for penetration of the broader business plane market. They are insisting upon dealer and distributor staff training and at the same time are promoting programs which provide a continuous measurement of the buyer's attitude and his reaction to applied sales techniques.

One dealer commented that "there is no substitute for a good margin of profit" as a powerful incentive to sell. But once that has been established, then such fundamental facts as are incorporated in sales aids now being supplied by business plane manufacturers help accelerate penetration and clinch sales. He said, "For too long we've been giving away our profits through unwise trading and competition among ourselves. We must sell at a profit before we can afford trained sales staffs capable of breaking down the price barrier in markets that are yet to be touched."

Business plane operators spent more than two million more hours in the air last year than did domestic airliners. Business aviation which has grown to become a billion-dollar-a-year industry has just begun to mature and grow. END

"Flying for sheer pleasure has made a comeback in the past few years . . . it now ranks second only to business flying in total hours flown—an estimated 2.3 million in 1959."—E. R. Quesada, FAA Administrator.



New Cessna 210 takes off from the new $325,000 facilities at Sunny South Aircraft Service, Ft. Lauderdale, Florida.

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Air Breathing Engines

(Continued from page 41)

the trajectory, as has recently been proposed by General Electric.

For a missile equipped with some form of homing system, the ease with which maneuvering forces can be achieved within the atmosphere may well dictate an air-breathing engine as the best powerplant. Again, a decoy missile whose mission is to simulate the radar echo of a manned bomber with air-breathing engines will clearly have to follow the same course and have the same speed as the bomber and therefore have an air-breathing engine.

Before proceeding further, it will be well to catalog the different known types of air-breathing engines. Figure 1 shows these in pictorial form. Several features of interest emerge. First, only one of the engines does not contain rotating parts. This is the ramjet which is characterized by a complete absence of thrust at low flight speeds, so that a secondary propulsion system has to be provided. This is usually a rocket, although engine 8 is actually a ramjet with a turbojet (or it could be a turbofan) providing the low-speed thrust.

The second point to notice is that, in going from a turbojet to a turbofan to a turboprop, all that is really being done is to process increasing quantities of air. In the turbojet, all the air goes through the basic cycle and gets heated up to the maximum temperature of the thermodynamic cycle. In the turbofan, some of the air is used only for propulsion by being bypassed around the thermodynamic cycle portion of the engine. This is also true of the turboprop and of the turboshaft engine driving a helicopter rotor, if we look upon the propeller or rotor as a special kind of compressor working at very large volume and very low pressure ratio. The increasing amounts of air are accompanied by ever-decreasing velocities of efflux from the powerplant as a whole. Figure 2 shows, in fact, just this effect. The velocity of efflux of the air from the engine plus its energy-conversion system, if any, is plotted against disc loading, which is the thrust per unit area of thrust-producing device. It will be noted that the velocity varies all the way from a few feet per second to several thousand. The propulsive efficiency also varies, therefore, with each device and with each flight speed. Thus the helicopter is good at zero speed and a jet engine is good in the high subsonic and supersonic regions of flight speed. There is, in fact, a correct choice of air-breathing propulsion devices for each speed, with, of course, some overlap from which two or more systems can be selected. Figure 3 illustrates this. It might appear that the turbofan is overlapped to such an extent by the turboprop and turbojet that there is not much advantage from it. However, this is not necessarily so. Some of the advantages of the fan should be briefly mentioned here. They are: good matching between cruise and take-off thrust, lower fuel consumption sensitivity to throttling back, and improved low speed

(Continued on page 62)

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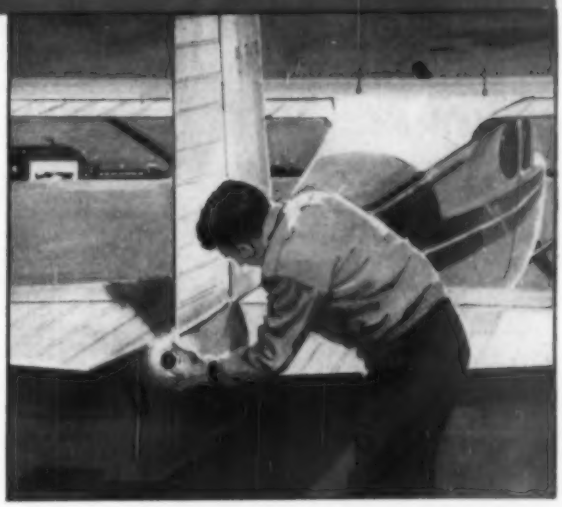

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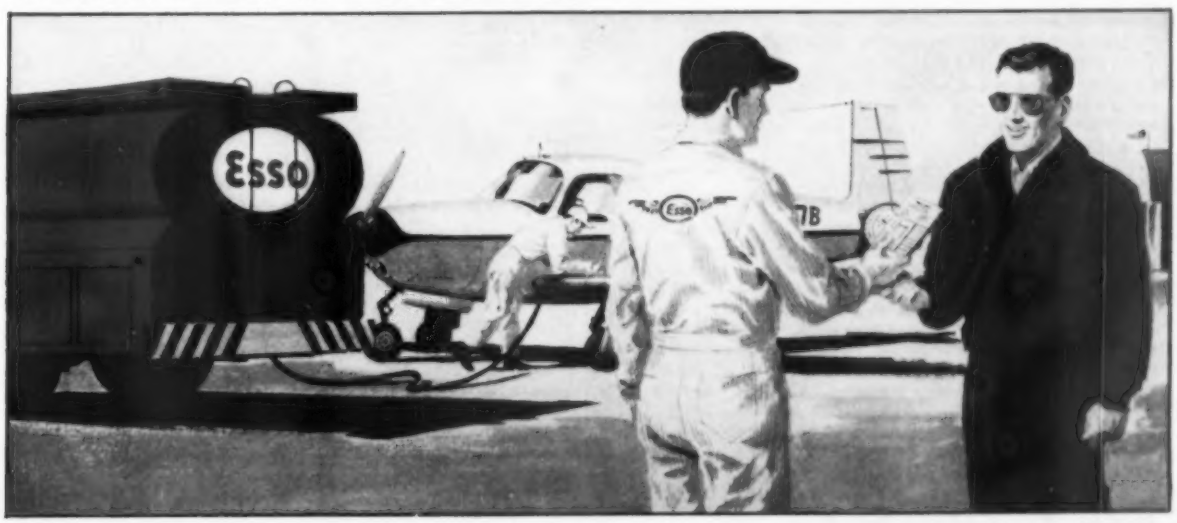

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(Continued from page 60)

characteristics compared with a turbojet. A lack of military backing has prevented somewhat the turbofan from coming along quickly but it seems likely to find an important niche for transport aircraft flying in the range of 0.8 to 0.9 Mach number.

Another item of interest on Figure 3 is the very large speed range of the turbojet engine when fitted with an afterburner.

Reverting again to Figure 1, a few comments on the remaining engines are in order. The pressure-jet helicopter engine is shown, as it illustrates one particular case of a gas turbine arrangement where the engine components are not all in one closely-knit package but are disposed in a manner which fits the special requirements. In this case, the helicopter rotor is turned into a reaction turbine which needs no transmission system, such as shafts and gears, in order to apply the power to the consuming device. There are many ways in which special powerplants can be concocted by using gas turbine components as building-blocks in much the same manner.

The turbojet-ramjet combination provides the favorable high Mach number characteristics of the ramjet with the low speed thrust of the turbojet, however, at the expense of some extra weight and complexity.

The air-turborocket uses the decomposition of certain fuels (which produce heat when they decompose) to power a turbine driving the compressor. Thus the engine is air-breathing but the compressor is not driven by an air-breathing component, hence the name of the engine.

Finally it may be noted that nuclear energy can be used as the source of heat in any of these engines.

An idea can be obtained as to the problem involved in achieving high flight speeds as soon as the type of fuel is specified. The engine is a heat engine so that, at some part of the thermodynamic cycle, heat must be transferred from the fuel to the working fluid, the latter being, of course, air, in the case of air-breathing engines. The maximum temperature achievable by burning a correct mixture of ordinary jet fuel and air is 6,000 F.

If we accept the condition that air must be slowed down to substantially zero speed before combustion can be sustained, then flight speeds greater than Mach 9 cannot be achieved since no heat can be added to the air after it is taken aboard, as temperature of air incurred in bringing it to rest at these velocities will be roughly equal to 6,000 F.

This is an over-simplification of the actual conditions which include the phenomenon of dissociation of the combustion products and consequent absorption of some of the released heat. However, it indicates the presence and nature of the limit for the conditions assumed.

Some indications have been given here of the reasons why atmospheric flight and air-breathing propulsion devices have certain fundamental advantages, and the principal types of engine discussed. Now we may turn to the consideration of future areas of applications of air-breathing engines. Some will extend for many years into the future—as far as one is able to predict. Others will have a more limited life.

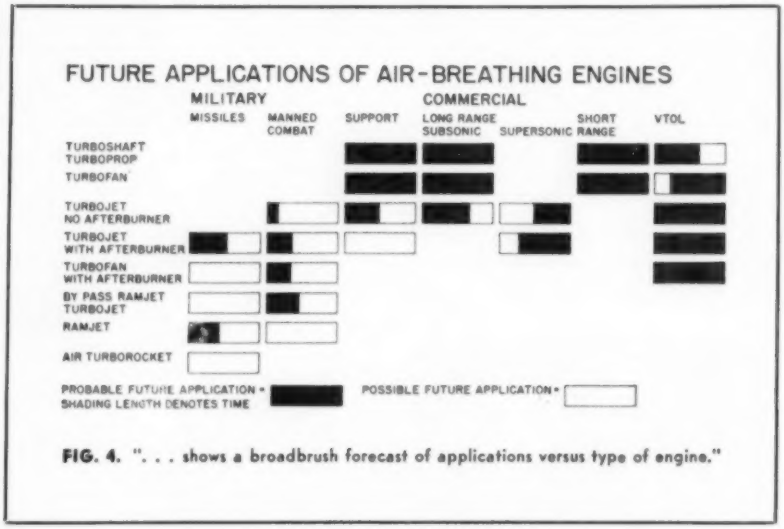

FIG. 4. ". . . shows a broadbrush forecast of applications versus type of engine."

Figure 4 shows a broadbrush forecast of applications versus type of engine. The diagram has been given a degree of coding as to length of time and probability of the application in such a manner that the darkest areas indicate the most important areas and vice-versa. It is seen that the conventional air-breathing engines are going to have a considerable run for their money, in both the military and commercial fields. There is some emphasis on the commercial end, as might be expected, inasmuch as rockets do not play a serious competitive role in this field, at least not in the immediate future.

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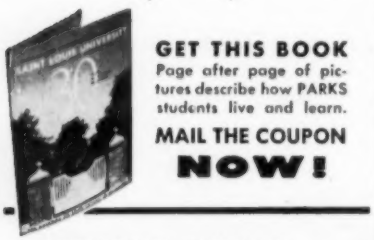

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Aero Commander

(Continued from page 49)

in the 20-degree temperature. A call to the tower and we were cleared to taxi to the runway. Assuming that the nosewheel was steerable, I used rudder to turn out of our parking spot. Imagine my consternation when it felt as though the rudder was swinging freely and had no effect on the nosewheel. Bill must have been expecting this because, before I could frame my question, he grinned and answered, "Yes, it's steerable. It's hydraulically operated power steering. Just go ahead and try it." This I did. Aero Design has done an outstanding job on this feature. Rudder pressure necessary to steer this airplane is feather-light, there's no slack in the system and it is pure pleasure to handle this airplane on the ground.

At the end of the runway we made a normal engine check and received clearance for take-off. I was surprised at how readily the 500 accelerated. With only the 250-hp Lycomings and a gross weight of 6,000 pounds, it seemed only reasonable that it might be on the sluggish side. It is true that only four of us were aboard and an hour's gas had been burned out of the tanks. Taking it easy on the first take-off, I lifted off at about 85 mph and, almost before my hands were on the gear lever, we were past 95 mph and continuing to accelerate. Ninety-five mph is the magic figure on the 500. The instruction manual reads very simply. "Loss of engine before reaching 95 mph—close throttle and stop. Loss of engine after 95 mph—take-off can be continued if necessary or desirable." Later I talked to several pilots who had had engines cut by their instructors at speeds as low as 80 mph. With plenty of runway they continued to accelerate past 95, take off, and go around the field on one engine.

Another nice feature noticed during this take-off as well as on several occasions during the flight was that the gear operates very quickly, both up and down. In a tight spot, such as engine failure on take-off, this fast operation can be a very comforting aid to a successful go-around. Another thing I liked about this airplane. Due to its configuration, the main gear can be observed visually.

Bill suggested that, for cross-country purposes, a climb at 130 mph be established. This was done with full throttle and props set at 2,450 rpm. After the initial surge, the rate of climb stabilized pretty well between 1,000 and 1,200 fpm all the way up to our cruising altitude of 8,500 feet. Sixty-five per cent of power, he informed me, was 20½ inches manifold pressure and 2,300 rpm. In the process of leveling out, I discovered the elevator trim is quite sensitive and delightful to use. It's not necessary to do a lot of cranking to get the desired trim tab setting. Giving the airplane plenty of time to settle down, the airspeed stabilized and hung 170 mph. With an outside air temperature of ten degrees, the TAS worked out to 188 mph. With full throttle and 2,400 rpm, we were able to pull 75 per cent of power and get an IAS of 178

(Continued on page 66)

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(Continued from page 64)

mph which trued out to 198 mph. With this well established we backed off to 55 per cent of power using 18.7 inches of manifold pressure and 2,200 rpm. This is the suggested power setting for a maximum range of 1,100 miles with 30 minutes reserve fuel. Our figures showed this could be done with a TAS of 172 mph—a very respectable speed for this kind of airplane.

A short 50 minutes after leaving Wichita, we approached Tulakes Airport just northwest of Oklahoma City. Slowing to 130 mph, I lowered the gear and swung into the downwind leg. Incidentally, the gear can be lowered at 180 mph if necessary. Slowing further to a pattern speed of 100 mph, we turned base and then final. By lowering full flaps, speed was further reduced to 95. This is as easy an airplane to land as any I've ever flown. I felt comfortable and right at home all the way down. Landing into a 16-knot wind, it took a bit of throttle to bring us up to the turnoff which was approximately 2,300 feet from the end of the runway.

Leaving Tulakes Airport, we had five passengers aboard and full tanks of gas. This brought us within about 340 pounds of the 6,000-pound gross weight. I could tell very little difference between the way we accelerated and the distance it took to break ground at the lighter weight of the previous flight.

Best climb speed is given as 110 mph and this I tried to hold as closely as possible in the bumpy air. Most of today's airplanes, at best rate of climb, have a nose high position that is uncomfortable and certainly cuts down on forward visibility. The 500 also has quite a nose high position and looking back at the cabin passengers it appeared to be even more so, but due to the very forward seating of the pilot, visibility does not suffer much. Factory advertising says the initial rate of climb at sea level is 1,400 feet per minute. In this climb I was using full throttle and full rpm. We went to 8,600 feet and the rate of climb showed an average of 1,000 fpm for the full climb.

Leveling off at 8,600 feet, I trimmed out to a true airspeed of 188 mph and pulled back one throttle. Even with a windmilling propeller, the yaw was quite mild, taking very little rudder pressure to hold a heading. And, if you're real lazy, it's easy to hold the heading by merely twisting in a little aileron and leaving your feet on the floor.

Slowing down to 95 mph, I lowered the gear and flaps and then, simulating a go-around from a landing approach, shoved the throttle forward and cut the mixture on one engine. This is about as severe a situation as one might encounter. By the time I got the propeller feathered, gear and flaps up, and everything stabilized, the airplane lost about 150 feet of altitude. While this may not speak too well for the rapidity of my single-engine procedure, I didn't think it was too bad, especially considering the load and the altitude. For we were 500 feet above the single engine service ceiling which is given as 8,150 feet.

The stall of the 500 has a characteristic which I had run into only once before, of the Cessna T-37B jet trainer. I discovered it first on power-on stalls with gear and flaps up. Of course, the nose has to be pulled quite high to get the speed down to 80 mph where the warning horn first sounded. As the airspeed continued to drop off, I kept waiting for a warning buffet. At 70 I thought there was a slight shake but it was so vague I could not be sure. The stall suddenly occurred just under the 70 mph speed and the plane rolled to the right. It caught me by surprise but relaxing on the back pressure was all that was necessary to get the airplane flying again.

With the gear and flaps down and power off the reaction was the same except the stall speed was 63 mph. This is one airplane where you had better depend on the stall warning horn and take corrective action when it first sounds.

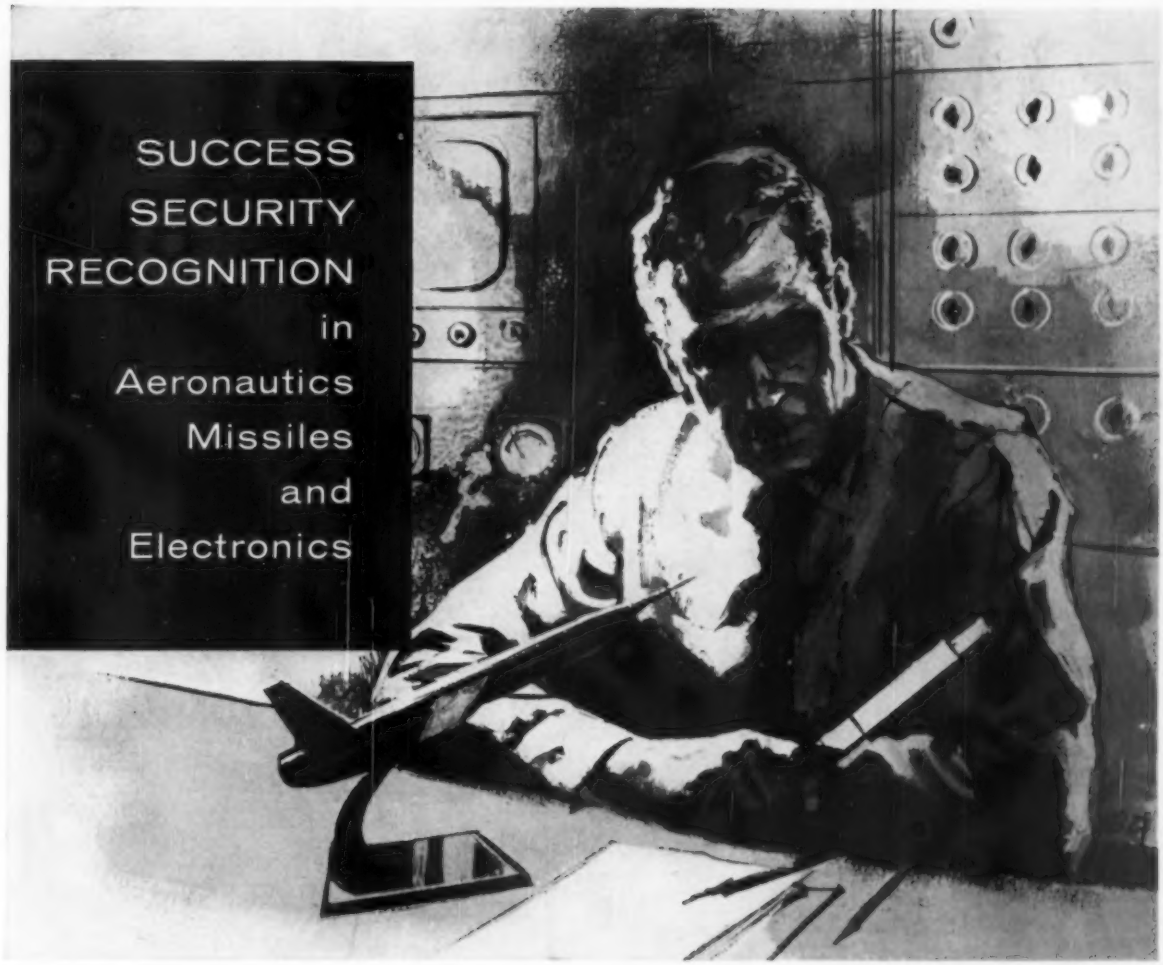
Following this we dropped down to lower altitudes to see how the airplane felt in the choppy air which had developed close to the ground. During the morning flight, in the smooth air of the higher altitudes, the 500 proved itself to be very stable and would go for long periods of time without deviation from its heading. In the bumpy air, of course, it would not hold headings for any extended periods . . . normal for most airplanes. However, the deviations were surprisingly small and a touch on the wheel would bring it back on course with little effort. Incidentally, the 500 flies very nicely with aileron alone.

We sidetracked a bit to about several landings at Strother Field located near Arkansas City, Kan. Again I was struck with the ease of landing this airplane. On one of the take-offs, Bill asked if I would like to see a demonstration of their maximum short field take-off. This, I allowed, might be interesting. On the end of the runway, Bill held the brakes and revved the motors up to full power. Before releasing the brakes, he sucked the wheel clear back in his lap, then released the brakes and let her roll. In very short order the nose popped up at which time he relaxed the back pressure to keep the tail from hitting and, before we'd gone much farther, the wheels came unstuck at 70 mph. Without relaxing back pressure, he brought the gear up and we climbed right on out.

While this is not recommended for normal practice, it's a very impressive demonstration of what the airplane can do. When the factory says the 500 can take off over a 50-foot obstacle in 1,400 feet and land over the same obstacle in 1,350, I, for one, am inclined to believe it.

On our approach to Wichita's airport we were cleared for a straight-in approach, number two behind a Cessna 182. Three-quarters of a mile off the end of the runway, we finally picked up the 182 a scant quarter mile ahead of us. The tower suggested, and I subscribed to the idea, that we make a 360-degree turn to get a better separation. I had been holding 100 mph and knew we'd be nudging the other airplane by the time we got to the end of the runway. Bill, however, said, "That's all right! Just slow down. We've

(Continued on page 68)



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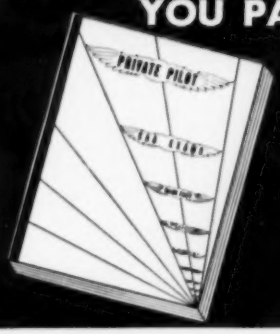

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(Continued from page 66)

got plenty of room."

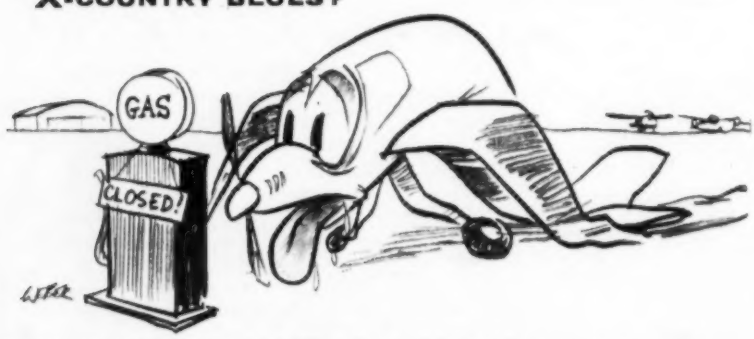
This I was somewhat loath to do but, if he said okay, it was alright with me. We throttled back to 85 mph and, sure enough, Bill was right. We held a good separation and I discovered that the 500 is an easy airplane to set on a spot. With just a slight hint of throttle manipulation I was able to put the 500 down within ten feet of the end of the runway. Even at this slower than normal approach speed the 500 felt good and solid with plenty of control. It was a graphic demonstration of how the Commander can hold its own in almost any kind of traffic, fast or slow.

Some of you sharp-eyed readers may have noticed that some of my performance figures were slightly below those specified by the factory. If I had been in the market for an airplane of this class, the slight discrepancies would not have stopped me from making a buying decision. Even my figures indicated excellent performance. At the same time it bothered me. I knew that the differences could be explained in many ways—lack of familiarity with the plane, lack of calibration on the instruments, differential from standard temperatures, etc. To satisfy myself, since I didn't have a chance to fly another similar model, I made my own private little survey among several Aero Commander pilots.

Almost every one of them put their fingers on the fact that our check plane rolled off at the stall. They swore that a properly rigged Commander will break straight ahead in a normal stall. They spoke from further experience that rigging plays an important part in performance. One pilot said that improper rigging on his new plane was responsible for a ten mph loss in cruising speed. When adjustments were made, the plane picked up that much. Not only did this convince me of the accuracy of the factory figures, but the company guarantees in print that their airplane will meet all specifications within three per cent.

My final impression of the 500 is that Aero Design and Engineering Company are offering, in an unobtrusive sort of way, quite a package of good performance, flexibility, handsome appearance and comfortable interior. END

X-COUNTRY BLUES?



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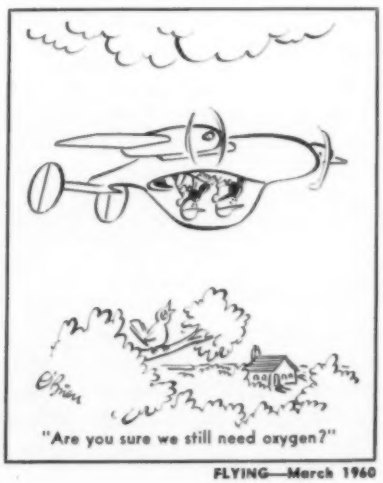
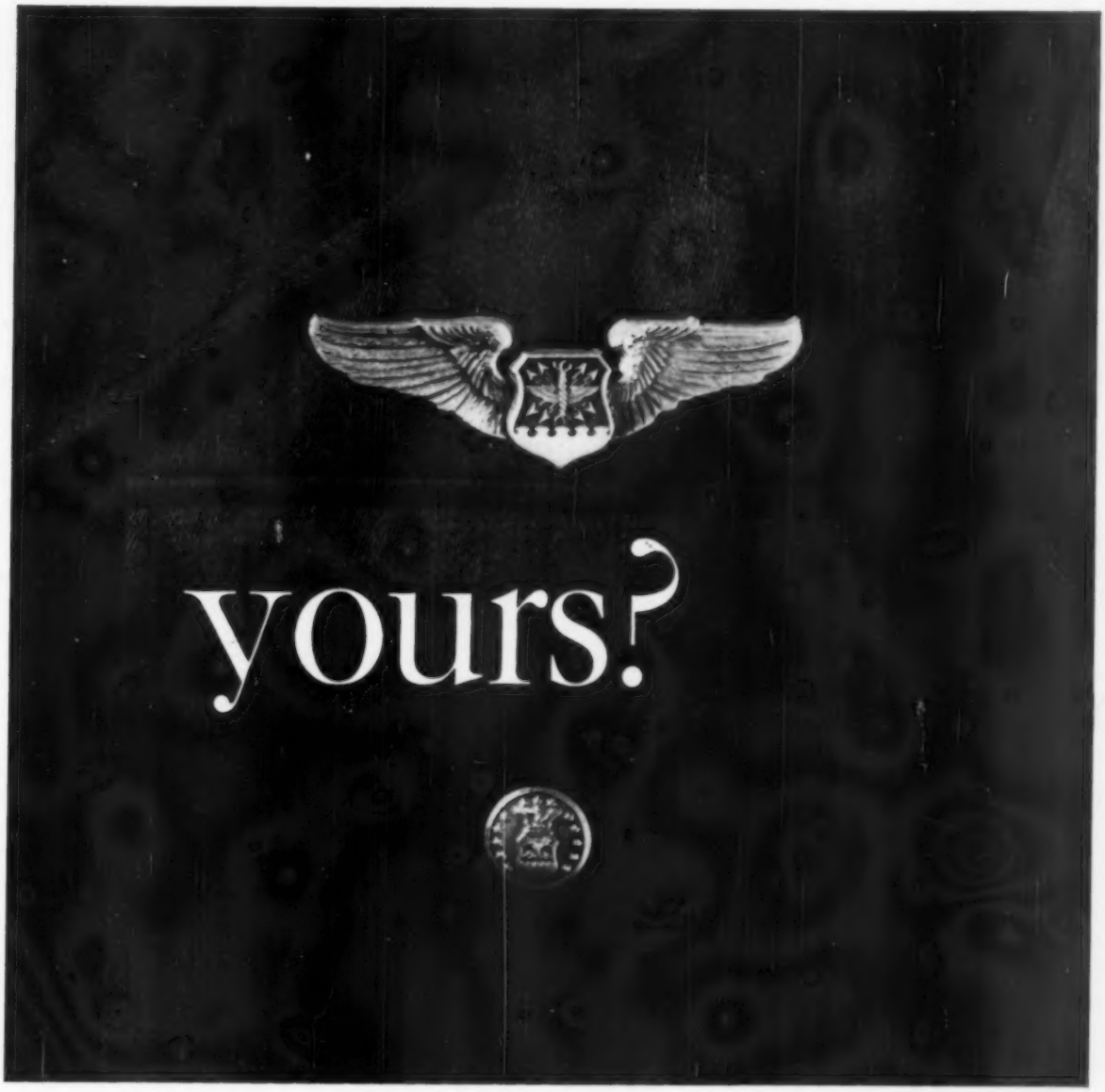


"Are you sure we still need oxygen?"



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Fuel Contamination

(Continued from page 47)

built a fuel system duplicating exactly that of the plane he had seen exhibit such strange behavior. It consisted of clear plastic wing tanks, metal tubing, and a sediment bowl. First, he filled the tanks with gasoline. The fuel system operated smoothly. Then he poured a large quantity of water into the tanks and waited for it to appear in the sediment bowl. He waited 30 minutes—no water. He added more water to the tanks. Again waited, this time for an even longer period. Still no water. He found that he could drain three soft drink bottles full of clear gasoline out of this system before the water showed up. When it did appear, it acted as it was supposed to, the water draining, clean gasoline following. The puzzled executive again built a fuel system, this time with clear plastic fuel lines. Now he would be able to actually see what was happening. In went clean gasoline. The lines filled smoothly. Then he added a generous quantity of water. The water settled to the bottom of the clear plastic "wing tanks," in the approved fashion—but—and the veteran pilot could scarcely credit his eyes—the water did not penetrate the fuel-filled fuel lines. It remained as shown in Figure 1.

A pilot might drain a sizeable quantity of gasoline—or glance in at the clear sediment bowl—and take off, confident that the fuel system was safely water free. If water was in the wing tanks, apparently it would wait until the gasoline was consumed, then follow it to the carburetor!

The investigator took his apparatus and theory to an aircraft manufacturer where the engineers could scarcely believe the evidence. Upon seeing the demonstration the engineers realized that the lighter gasoline blocked the path of the heavier water because it had in effect "gained weight" by being enclosed in the tubing.

Many personal planes have fuel lines entering the wing tanks just above the bottom of the tank to provide a sump area in which small quantities of water and sediment could accumulate without entering the engine. These impurities are generally removed during each periodic inspection.

But consider the following situation. The aircraft has not been in use for a long period of time, parked outside or under cover. Moisture has collected in partly filled tanks and settled at the bottom. There is not enough water to reach the fuel lines while the plane is in level flight (Fig. 2) but on the first turn, after take-off, especially if the turn is poorly coordinated, water will enter the lines (Fig. 3) and cause the engine to stop.

Interesting? Yes!

A preventable situation? Of course!

Simply drain wing tank drains as well as the sediment bowl. It's as easy as that. For maximum peace of mind, install quick drains on wing tanks.

The insurance executive who made the experiments described here took his mock-up to Washington. There aeronautical engineers and engine experts asked for an actual test in a commonly used, very popular aircraft. The experts watched in amazement as the executive poured three gallons of water into a half-full fuel tank. After a few minutes the fuel strainer (gascolator) was checked for water. It was necessary to drain ten liquid ounces (a soft drink bottle full) before any water appeared in the strainer bowl of this aircraft! Since this aircraft was equipped with a tail-wheel, a second test was made. In the second test the same aircraft had the tail raised to simulate later models with tricycle gear and the fuel system cleared of water. Then one gallon of water was added to a half-full fuel tank. Only clear gasoline appeared at the sediment bowl. More than a *quart* of fuel was drained this time, before any water appeared.

In both tests about nine ounces of water remained in the fuel tank after the belly drain and gascolator strainer had ceased to show any trace of water. This residual water could be removed only by draining the tank sump area! Engineers noted with interest and concern, two highly significant findings from these two brief tests: Water introduced into fuel tank did not flow down fuel line into strainer and did not drain to the low point in the system! It was necessary to drain fuel tank pumps in order to remove all water from the tank. It appears that one or two drops of water put into the top of a fuel line, will penetrate the tubing full of gasoline. But greater quantities fail to do so and seem to follow the fuel to the carburetor!

Involved in this phenomenon are physics too complex to explain readily. Capillary action seems to be the chief factor. Surface tensions of varying fluids may also enter the picture. But the point, pilots are most concerned with, is the uncertainty that the fuel lines are free of water contamination until tanks and sediment bowl are checked.

Statistics may soon reflect a decrease in those abrupt engine stoppages—a satisfying percentage at least!

The airlines learned the lesson a long time ago. Reglations require that all fuel tanks sump areas must be drained and checked for water whenever the airliners are refueled. As a result, no accidents due to fuel contamination have been reported in airline operations.

Incidentally, the executive mentioned in this article is Dave Kratz, president of National Insurance Underwriters, St. Louis, Mo. who spends most of his time in accident investigations aimed toward the development of preventive means. END

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(Continued from page 29)

lineman put a tow bar to the nosewheel strut and pulled the 245,000-pound jet from the loading dock to the taxiway.

This towing action stole seven minutes from the printed schedule.

Within another ten minutes, Captain Kasper had jet Flight 45 positioned on runway 22L, ready for the take-off. At 9:50 a.m., the tower's clearance triggered the 45-second dash into the air.

From this instant on, it was another world for air travelers. As the 707 pointed its nose toward higher altitudes than most of its passengers had ever been before, first-jet-flight anxiety drifted away. Passengers relaxed as if to say, "Why didn't someone tell us it was like this!"

During the climb-out westward to the initial altitude of 23,000 feet, Captain Kasper was vectored by Air Traffic Control radar through the crowded, lower, piston-engined airlanes. Near Pittsburgh, he dipped the nose to level cruise position and the miles started clicking away at the rate of nine a minute.

At one time or another, all of us secretly share a strong curiosity to know more about fellow passengers—why they are traveling, what personal reasons make it necessary for them to be up there with you? This was my assignment.

Talking to 115 persons individually is a substantial task, even when time isn't a limiting factor but, doing it in five hours with a lunch period included, allowed only three working hours.

As it turned out, the goal was too high. There was time for only 70 brief interviews. Come along as we visit with a few of the passengers on Flight 45.

First, in the luxurious lounge of TWA's $5,000,000 jet liner we met Joe Perrelli, of El Cerrito, Calif., a student at the University of Santa Clara. Joe was returning from Europe with his family. He had flown United Air Lines on the eastward leg of the journey and Alitalia Airlines to and from Rome. He said that his dislike for a "a long, boring, vibrating, droning air trip was now gone—jet offers true relaxation, less boredom."

At Number One seat in the first class cabin we met Mrs. Beverly Conover, whose daughter, age three and one-half, lay at her feet asleep in a TWA cradle. Mrs. Conover was making her first plane flight. She was obviously pleased.

"Why are you making this trip?" we asked.

"My husband has changed jobs. He's now a biologist in Sacramento at the California State Fish Hatchery, so our trip is one way from Leonardo, N. J."

She beamed as she said, "I feel sorry for those mothers who had to suffer four or five days making this trip by car or train. Here I am, doing it in five hours! The way it's going it will probably be just one long nap for Debbie."

Have you yearned for the days when you could have enough time and money to travel frequently? The next passenger was such a lucky person. She was also welcome company for Mrs. Conover:

Bernice J. Coutts has been a nurse for 18 years at the Asbury Park, N. J., ele-

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mentary school. She has planned her life and invested her hard earned money expertly enough over the years so that, "now I can travel whenever school terms let me."

The next passenger was J. H. Yein, sales engineer for St. Regis Paper Co. of Princeton, N. J. His work requires that he travel two to three days a week. Princeton Aviation Service had delivered him to Idlewild that morning by small plane. He believes jet age travel will intensify competition in business as well as open up new opportunities.

This trip was an especially significant one for Mrs. Malcolm Donald of Brookline, Mass., and her daughter, Mrs. Lloyd Pearson of Weston, Conn. They were going to Mrs. Donald's granddaughter's wedding. It was the first jet flight for both of them but Mrs. Donald, who stopped reading a book to speak with us, made her first flight from Prague to Warsaw in a two-passenger, open cockpit plane in 1921. Then she was doing field work with the Red Cross in Europe. She has made the air trip to the West Coast about six times.

At seat 3A, a prominent West Coast investment house official said the jets were making it possible for him to do more in the same amount of time. He had just accepted a seat on the board of directors of an eastern financial house, on the premise that jet travel will be available. He had been in New York one full day and a night. He planned to be in his San Francisco office by 2:00 that afternoon.

"My travel habits, and those of others like me, are due to change," he said.

In rapid succession we talked with:

Robert B. Harris and family of Hillsborough, Calif., returning from a three-weeks combination business-vacation trip. They did aerial sightseeing via Eastern and Allegheny Airlines;

An American from Saudi-Arabia, returning to his San Francisco home for a brief vacation;

Mrs. Avis Badami, vacationing housewife of Elizabeth, N. J., who flies airlines about once a month—and often joins her husband in a four-passenger Piper Tri Pacer for week-end trips;

Conference-bound Dave Gerstein, of Great Neck, L. I., N. Y., vice president for military and industrial sales for Olympic Radio and Television, who travels about 100,000 miles a year;

A New Zealand business man, John Watt, of Auckland, who was en route home after 60 days in England;

And Everett K. Wallace, returning to Seoul, Korea, following a brief vacation in New York City.

At seat 16 F, we met Marilyn Brett, who was busy with knitting needles. Marilyn was starting a national tour as a women's consultant for Hearing Aid Industry conferences. Her schedule included more than 16 cities and, she said, "I'm starting it right by going jet."

In the coach section we met vacationers and business men who believe jet speeds at coach prices are the most economical "buys" in transportation today.

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(Continued on page 74)

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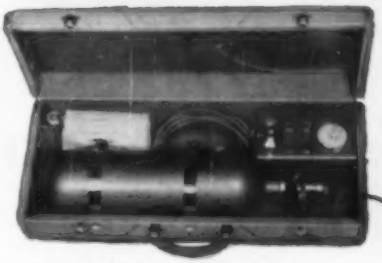

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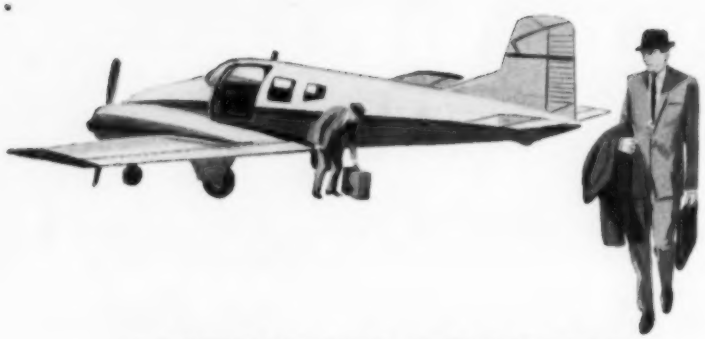

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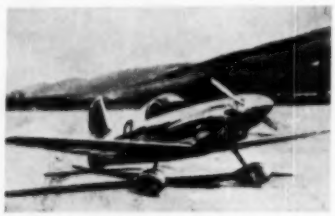

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(Continued from page 73)

sengers were starting vacation trips. Their plans included visits with relatives, 3½ weeks of driving along the Pacific coast and in state parks via a rental car; boat-air trips to Hawaii; pack trips around Mt. Shasta; a mother accompanying a daughter on a business trip—and wives accompanying husbands on business missions; and, of course, a honeymoon couple Honolulu-bound.

In the home-going ranks of vacationers, there were passengers returning from Rome, London and Germany; students coming home from special study classes in the East, and Pacific coast citizens returning from eastern tours that even included Miami, Fla.

After tallying all statistics, passenger comments and notes, this is what a typical cross-country jet flight revealed in terms of trends, desires and economic facts of life:

About 30 passengers were aboard for business reasons, 32 were on vacation or visiting friends or relatives, four for both business and pleasure, and five for other reasons. Of the latter, two passengers were heading for a Hawaiian honeymoon, two others for a wedding, and one for a new home.

Would they have been making this trip anyway if jet planes were not available?

All but two said "Yes." The two dissenters said they would have gone by boat.

Where did they come from?

New York City (32), Paris (3), Rome (3), London (3), Prestwick (1), Saudi Arabia (1) and Frankfort, Germany (2). U. S. communities other than New York City included Cincinnati, Philadelphia, Boston, Hartford; Poughkeepsie and Schenectady, N. Y.; Augusta, Me.; Huntington, Garden City and Great Neck on Long Island; and Lodi, Asbury Park, Princeton, Leonardo, Elizabeth, Glen Rock, Hazlet and North Bellmore, N. J.

These passengers were either returning home or had outgoing destinations to: San Francisco (51), Los Angeles (5), Honolulu (5), San Diego, Selma, Los Gatos, San Jose, Sacramento, in California; and various vacationing or business destinations in the western region. New Zealand and Korea were the foreign countries listed as western terminals.

An interesting economic note was made of these facts: Sixteen of the 70 passengers interviewed planned to rent cars; five planned to stay at airport motels; 25 would stay at mid-town hotels and others not going home would stay at suburban or resort hostelries.

Of the business men questioned:

- Fourteen believe jet speeds and service will intensify competition, nine said it will not, and the rest had no opinion. Nineteen believe jets will broaden business opportunities.
- The majority believe jets will provide more time in the office and at home; but three said "no" for the office and six said it would not allow more time at home. The reason? Any time saved by jets would be demanded by the job.
- Seven men said their families objected to their flying jets, while only four said objections were raised to conventional

piston-engine plane travel. Only one company employer was reported to be against air travel. (This is a far cry from the late '30s when the ratio was about eight families out of ten against air travel, for example.)

- Only two passengers planned to continue to destinations other than the San Francisco area by train or bus. Their journeys were short commuter distances not served by airlines.
- Six passengers reported last year's travel to exceed 50,000 miles, of which three said their travel exceeded 100,000 miles. Eleven indicated their annual travel mileage ranges between 15,000 and 50,000 miles, of which 90 per cent is by air.

Other reactions of passengers included:

- Belief that airport hotels would receive an increasing share of the air traveler's business.
- Auto rentals should be designed for greater convenience.
- Transportation time to and from jetports must be reduced.
- Airline baggage handling has improved at some mainline terminals where jets are concerned but little or no improvement has been made for other categories as yet.
- Delays in ticketing and checking in for jets offset many of the fine en route comforts of the new planes.
- Passengers accept the fact that delays will occur when new equipment is phased in to the system—some like the role of a "pioneer." But many were critical of long delays while passengers were kept uninformed. This prohibited changes in plane connections at en route destinations.

As Flight 45 sped quietly and effortlessly into the lower altitudes around San Francisco and Oakland, passengers started conditioning themselves for the hustle and bustle of earthly living again. There was a thin layer of fog overhanging San Francisco's new but already overtaxed International Airport. Captain Kasper slipped the big jet through the overcast without a ripple.

Having consumed much of its 91,000-pound fuel load during the flight, the 707's touchdown weight was reduced to 160,000 pounds. Its landing speed was about 150 miles an hour. The landing was perfect. On Ground Time: 1:07 P.D.T. En route flight time was five hours 45 minutes.

It's too early to chart the trends scientifically and with adequate operational analysis. But FLYING's vignette of TWA's Flight 45 demonstrated the overwhelming passenger preference for jet travel which is borne out in '59 traffic figures. This brief glimpse helped answer many questions as to why people travel and why many of them prefer to go by air.

As our taxi began to fight the highway traffic battle to downtown's Fairmont Hotel, we were reminded again of the beginning—the one hour and 25 minutes to go 30 miles by car, compared to five hours 45 minutes to leap 3,000 miles by jet. It underscored the fact that the greatest headache for expansion of tomorrow's air traffic is on the ground.

Lastly, Flight 45 provides a potent capsuled illustration of the world-wide economic and social impact of just one jet flight. END

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Newark Air Service

(Continued from page 43)

hangar space as individual shop areas to companies preferring to do their own maintenance.

The hangar and an adjoining office area is situated on a nine and one half-acre site. The hangar totals 43,000 square feet, of which 19,000 is for aircraft storage and the remaining 24,000 is devoted to tenant and NAS maintenance rooms and offices. NAS provides a spacious reception room, a customer conference room, crew lounges, a weather room, a parts storage room and office management areas.

Drake says that air taxi and charter service is growing at a healthy pace. He attributes much of the increase to the need for fast communications and connections with the other metropolitan air terminals, and he notes that more airline passengers are capitalizing on advantages of air taxis to reach business destinations within a radius of 50 to 300 miles. In addition, more firms are chartering transports to carry staff members to distant destinations and to perform industrial missions. Convair, DC-4, Aero Commander and Cessna type equipment is employed for this work.

One aspect of NAS's service is different from the normal fixed base formula. The company holds fueling contracts with National, Braniff, Mohawk and New York Airways. It also operates consolidated ticket service as required for non-scheduled government and civilian transport operations.

Gross revenue for 1959 approached an all time high of $1 million since the new owners took over. Income for 1960 is expected to soar beyond this point as the company completes expanded services for transient and tenant aircraft.

It is interesting to note that payments to the Port Authority for rental and participation fees amounted to 18.1 per cent of the company's 1959 revenue.

As a convenience to operators, NAS collects PA landing and parking fee charges. The landing fee is based upon two cents per 1000 pounds of airframe weight at take-off with a minimum charge of $2.50 per plane. This also includes free ramp parking for the initial 12-hour period. The same rate formula applies to all Port Authority facilities.

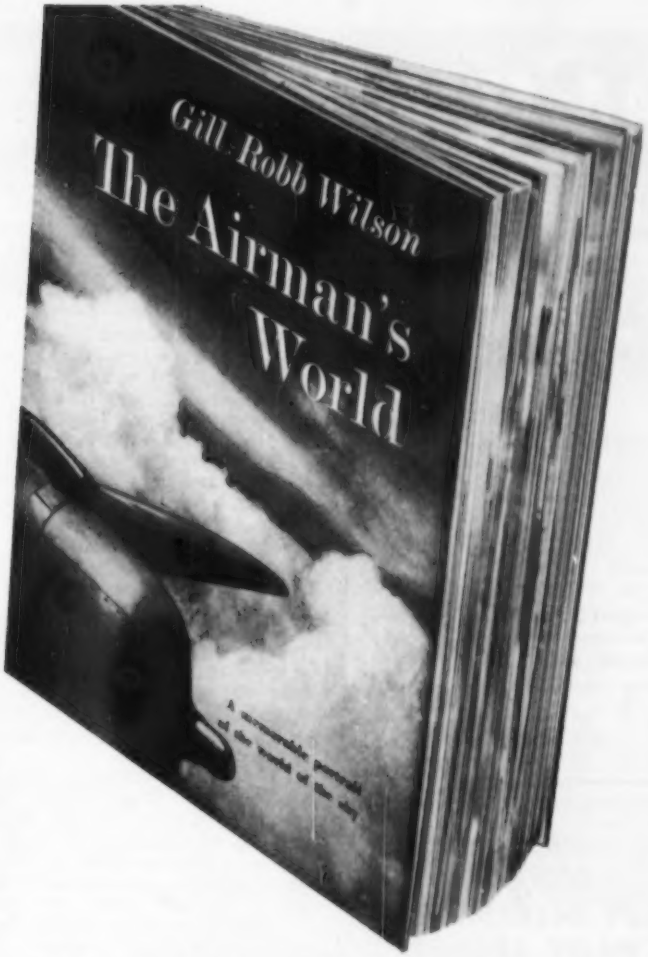
As passengers and air crews enter the main door, they are greeted by a smiling receptionist—and a coffee jug that extends a warm welcome. This in essence sets the tone of NAS hospitality. The receptionist assists in placing telephone calls, arranges hotel or airline reservations; calls for rental cars, taxis, limousine service or air taxi flights. NAS station wagons are available to the main air terminal—airline gates and restaurants—and to transport crews, passengers and baggage to and from planes.

NAS can be reached by UNICOM 123.0 for ordering of inflight meals, transportation, aircraft maintenance or a host of other services.

Pilot and passenger reactions to Drake's strategic location in relation to Manhattan and the current jammed airways bear

(Continued on page 78)

"...a sense of freedom such as man never dreamed"



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A WORD ABOUT THE AUTHOR

Gill Robb Wilson was a pilot with the French Escadrille 66 in World War I, president of the U. S. Air Force Ass'n, president and organizer of many flying groups...and is now the noted editor and publisher of *Flying* magazine. He learned to fly just after the Wright brothers successfully propelled their flying machine above the ground, and has been one of the leading figures in aviation ever since. In his book, author Wilson conveys the feelings known only by men who are at home in the sky, and explains this exalting sensation to those who have never flown.

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(Continued from page 76)

out his thesis that, where time is at a premium, precious minutes can be saved by using Newark airport.

This reporter talked with more than a dozen business pilots, some at Newark and others at La Guardia. Even though many said they had been using La Guardia for years, they found themselves changing destinations to Newark more often now as traffic and smoke-fog clog the Long Island air terminals. They indicated that the decision was usually based on the time factor—when company officials had to make important business appointments in New York City.

One pilot said the time advantage to downtown New York was more than an hour on several occasions when instrument landing traffic slow-downs forced delays at La Guardia and Idlewild. (Newark has Dual ILS, stroboscopic high intensity approach lights, radar, GCA and other standard equipment.)

Drake says the linking of New Jersey Turnpike with Newark Airport's main gate, and the expanded Hudson River tunnel facilities, make it possible for taxi, limousine or airport bus to be in upper or lower Manhattan within 20 to 25 minutes. The costs are on a par with Idlewild: Taxi to 42nd Street is about $7 plus toll; airport limousine is $1.35; private limousine is $13.60.

Customers and Drake, too, feel that the present ramp space allotted NAS is grossly inadequate for the volume of business the company could handle if the area were to be increased. In fact, Drake believes the increased popularity of Newark as a base for business craft will force enlargement long before the Port Authority's plan has it scheduled. He has held preliminary discussions with PA officials but, as yet, definite expansion plans have not been divulged. NAS plans to obtain additional hangar and ramp areas adjacent to the present location.

One pertinent point mentioned by air crews was the need for close-in or on-the-premises motels. As yet Newark cannot match its two major sister terminals in this respect but Drake hopes this situation can be improved. He does report that efforts are being made to interest top-notch restaurant-motel combinations to initiate station wagon pick-up services. He says there are numerous fine motels and city hotels at moderate distances from the airport for customers who plan to use rental cars. The city of Newark's hotels are only a few minutes—five miles—from the airport.

"We're in the black for 1959—not much, but we're there. Our faith in the future of business aviation and aircraft servicing here at Newark has been justified. With the continued friendly help and support of the landlord, I'm sure we can move ahead with a growing business.

"I believe this airport will become the largest executive or business plane terminal anywhere in the area. Naturally, the PA has the current problem of caring for the scheduled operators but, when their wants are satisfied for a time, I'm sure we'll get all the help we need." END

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I Learned About Flying

(Continued from page 53)

The thermal goes up like an invisible column of smoke, wavering in its course. And the minute you relax in contented satisfaction it goes off and leaves you with nothing but down." We were sinking at the standard rate of descent for the TG-3, about 250 fpm.

Easing our northerly flight path a little to the west, we passed over the hangar roof. "Last winter I had Hans Linde, a visitor from Germany, up here in a blinding snowstorm and we spent 20 minutes soaring over the hangar in light lift. Real Hangar Flying."

However, today there was no sign of thermal there and I crossed over the field on a westerly heading, observing that the drift was still light to the north so we would land as we had taken off. We passed over the west fence of the field at 800 feet and near the northern corner of the airport. Planning my approach pattern as a wide 270-degree turn to the right, I completed a careful pre-turn check over the right wing tip. Just then the ship gave a sickening downward lurch and the light flight noise ceased abruptly. Dumping the stick all the way forward to pick up flying speed, I was horrified to see the needle of the rate of climb pegged at 6,000 fpm DOWN! I instantly revised the landing plan to a 180-degree left turn and a crosswind landing. We now had regained airspeed, although pointing at the ground at 60 degrees. Slamming the ship into a steep left banked turn, it was then that the unbelievable occurred. The ship was turning all right, with a rapid yawing sweep of the nose over the horizon, but we were drifting sideways at an incredible rate of speed over the ground, southward and away from the airport. The rate of sink was now steady at 3,000 fpm down and in seconds it was clear that we wouldn't reach the fence line of the field.

At 100 feet I began a rollout to level flight not even knowing what would appear before us. We flashed by the windows of a small farmhouse near the corner of the field, zoomed over a chicken house and settled down into a curving creek bed at the bottom of a steep walled ravine. Easing the ship down to a stall, we slowly settled onto the rising bank of the creek. An opening in the canyon wall appeared before us and we rolled to a stop on a bench of land only 50 yards long. The ship stopped. Dust settled around us in the sudden silence.

I opened the canopy and stood up on the seat to stare back the way we had come. Except for the curving wall of the ravine it appeared that the only way to get where we were for the ship to fall straight down out of the sky. And that is what had happened. From 800 feet in perfect approach position to a creek bed a quarter mile from the airport in a matter of seconds.

Afterwards we understood what caused this near disaster. The jet stream was there blowing as predicted, though at a faster 230 knots.

It happened to me once but I'll be ready next time. Now I expect the very worst. I "check the weather." END

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HANGAR FLYING

DEAD STICK

FOR SEVERAL years my wife and I had talked of her learning to fly. Late in the fall of 1955, while stationed on the Gulf coast, we substituted action for words. I had a private license with a little over 280 hours, but hadn't flown for six years so I got back into the air at the same time.

One Sunday I went out to the field early to fly. Kay, my wife, came out a little later for a lesson. She had seven and a half hours of dual at the time and was working on take-offs, and landings. After her lesson I took her up for some airwork. I had already flown two and one-half hours doing stalls, eights, S-turns, and just having fun.

Kay took off smoothly and climbed to 2,600 feet as instructed. I asked for a stall and she started a power-on one. I told her I wanted it power-off. At this point three things happened at once—Kay dropped the nose, turned to look at me, and closed the throttle without putting the carb heat on. As the throttle started back, I pulled the heat on and, as she turned her head, the prop slowed alarmingly so I eased the throttle open, but to no avail. When she turned forward again, there, staring her in the face, was the stationary prop.

The butterflies were having a clambake in my stomach, and Kay was really shook. I told her to relax, that everything was under control—no sweat—as I wiped it from my brow. Throughout the emergency, she remained calm, after the initial shock, even took control while I removed my sunglasses and tightened the safety belt. I had to act the same. Having over 2,000 hours at the time as an AF navigator and with 22 typhoon eye penetrations under my belt, emergency situations were not strange to me, but it was the first time that the responsibility was all mine. At 2,500 feet, indecision is the main problem, too much time to think, and too many possible fields, that look good from that altitude.

A road parallel to the wind was very tempting, but it was dirt with brush on both sides. I finally picked what appeared to be a clear field 45 degrees off the wind. As I turned onto the base leg three dead grey trees appeared in the middle of the field. They had blended in with the dead grass from higher up. I had planned my approach with an alternate field right beside the primary; my secondary choice was sparsely covered with seedling pines about two to three feet high. For one nerve tingling moment the tall pines between us and my alternate were growing taller at an alarming rate. I eased back on the stick gently and the next instant we were dropping into the field. If it had been a hard-surfaced runway, we would have bounced into the next county. As it was, we hit in four to six inches of mud, rolled through a plowed firebreak and came to a safe stop.

A quick check of the plane showed no apparent damage, not even a scratch, and when the engine was started later it ran like a top. Carb ice had been the joker in the deck.

MAJ. ARLAND L. SHIEL
Columbus, Ohio.

ON COLLISION COURSE

IT WAS ONE of those calm, CAVU winter days when Bill and I decided to add half an hour or so to the barely 80 we logged together in our books. We rented a Cessna 172 and agreed to fly from the Cartierville Airport in Montreal to the much less frequently used single-runway-strip in Lachute for a few touch-and go's. The circuit in Cartierville was overcrowded at the time, with about half a dozen Cubs and 140s flying around the tower and we wanted to enjoy the pleasures of a short cross-country as well as improve our landings.

About seven minutes out of Cartierville and shortly after reaching 3,000 feet, we both found the Lachute-strip in the distance and decided on a long straight-in approach for our first landing. I pulled the carburetor heat, reduced rpms to 1,500 and set the plane for the long glide.

Reaching 900 feet, I judged that we were still on the high side and put on two notches of flap, slowing the plane down to the usual 80 mph. During this time Bill and I both scanned the sky and the ground for aircraft, well knowing that the airspace around Montreal can be pretty crowded at times. But we seemed to be completely alone. The windsock showed, as expected, that we were on the right track.

Passing over the small river which flows at a right angle to the runway, at about 80 feet, I was sure that I hit the approach on the nose and settled down to watch the runway.

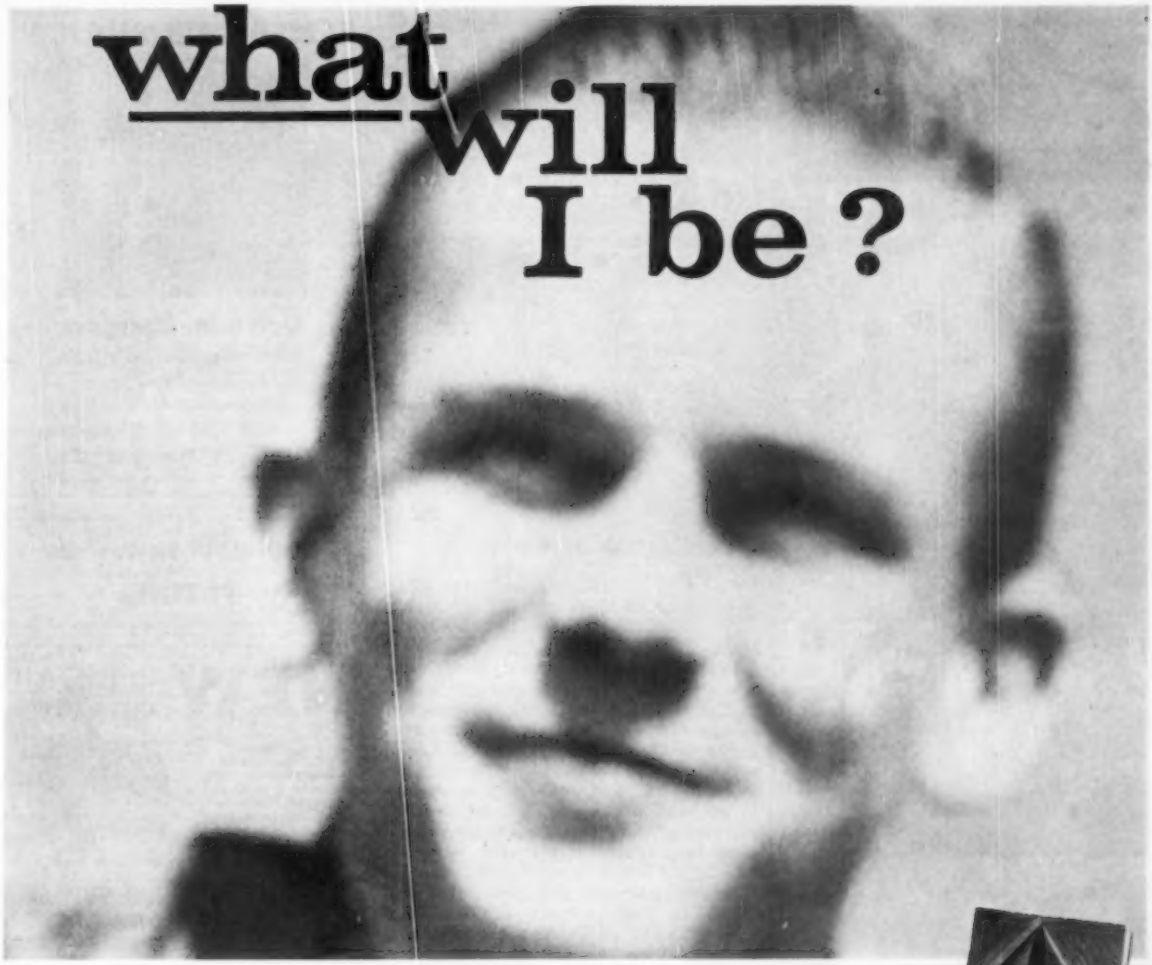
I may have been 30 feet off the ground and right over the fence, when something hit me hard and fast on the rim of my field of vision. I looked up and saw a twin-engined Beech 18 approaching fast at the same altitude from the other end of the 4,000-foot runway.

I actually do not remember having touched the throttle and the carburetor heat—but both were in against the panel, and I was banking off in a steep turn to the right, clearing the tops of trees surrounding the airfield by a dozen feet. I did not dare to pull hard back on the stick as the plane did not seem to accelerate well—it took me a few seconds to realize that my flaps were still down.

By then I was well out of the path of the Beech. The other pilot must have

(Continued on page 82)

what will I be?



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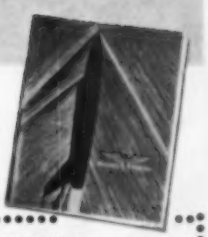

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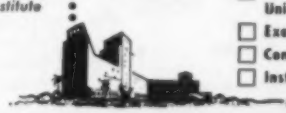
- ☐ Commercial Pilot
- ☐ Instrument Pilot



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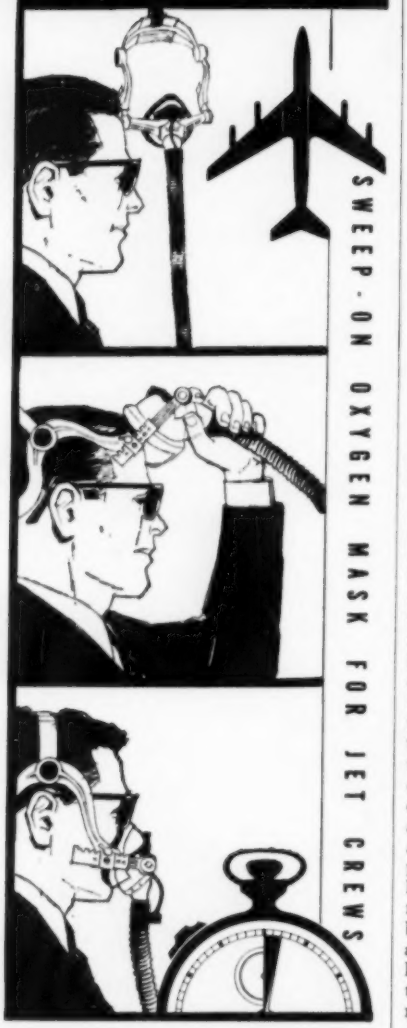

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Hangar Flying

(Continued from page 80)

noticed my Cessna a few fractions of a second later as I saw him pulling off to the left.

I did not realize until later, when Bill was flying the plane from the right hand seat back to Cartierville that the Beech did not have its wheels down for landing. From this and from the fact that it was approaching the strip downwind, I assume the pilot must have been doing just a low pass without intending to land.

Since that day Bill and I have logged many hours and we both have landed at many a small airport without tower or radio. But I am sure that neither of us have failed to go through a standard landing pattern before touching down.

ROBERT ROCI

Lachine, Canada

UNGOVERNED PROP

I WAS RETURNING to Detroit from Chicago with my wife in my 182 Cessna, and quite happy that I finally had converted her to fly in a single-engine plane.

I just passed over the South Bend Omni when it happened. The tachometer began to flutter like a worn-out speedometer cable and stopped at 500 rpm, the plane began to vibrate, my air speed dropped and I began to lose altitude. Needless to say many thoughts went whirling around in my head, first a place to land, returning to the South Bend airport meant circling back—could I stay aloft to make it?—on my left in a northeasterly direction, approximately eight-ten miles was the Niles, Mich. airport—could I glide that distance? In addition to my immediate problems, Mrs. Herron began to ask questions, and I wasn't in any mood to answer, except to tell her not to become alarmed if we landed fast and would probably bounce the first time the wheels hit the ground. I was indicating approximately 125 mph, as we went over the boundary—far beyond a normal landing approach speed—pulled a notch of flaps, hit the runway, bounced approximately two feet, settled down on the runway and really hit the brakes. It was the closest dead stick landing in my limited experience of 150 solo hours.

My main objective in relating this experience is to warn all plane owners, flying an aircraft with the same type propeller governor. This particular governor is manufactured by the Woodward Company, Rockford, Ill. By plugging holes with screw-plugs, the governor is made interchangeable with other type propellers and aircraft. The amazing feature to me is that the screw-plug doesn't have a *safety-tie-wire*.

This screw-plug backed out and caused the propeller to go into low rpm and high pitch. This may have caused fatal accidents unsolved by the CAA.

I suggest all aircraft owners check their planes for this particular type of propeller governor and have periodic inspections.

DON HERRON

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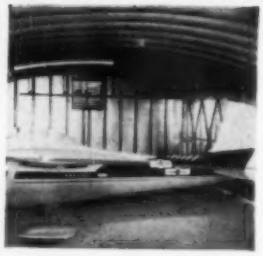

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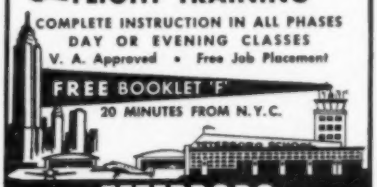

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Autopilot

(Continued from page 36)

servo and the amplifier will cause the servo to reverse direction until the servo signal is reduced to the same level as the gyro signal. This continues in one smooth, uninterrupted process from the instant the wing starts down in response to a gust of rough air until the original attitude has been restored and the pilot is not aware of the numerous steps in progress. So, you see, an autopilot always tries to keep itself in balance by balancing control surface position (servo shaft position) against gyro position.

Surprisingly, many experienced pilots think that all an autopilot will do is to keep the wings level and the airplane on a heading and in some way maintain a reasonable control on altitude. If they did only this they would be well worth having. But, in fact, they will do much more. The signal that the gyro introduces to the system is called the error signal and it is balanced out by the servo shaft signal as noted above. However, it is possible to introduce another error signal by means of a control on the pilot's control box. This is called the "command signal" or simply "command." To balance out this signal, the servo will first move as it does to an error signal provided by the gyro; however, this will cause the aircraft to roll from level flight. The gyro will sense this change of position from level and send signals to the servo that will neutralize the ailerons but not at the wings level position. The amount of error signal from the gyro will equal the command error signal introduced by the pilot and the system will again be in balance but at something other than level attitude. Thus we see that the pilot may fly the airplane in turns, climbs and dives by moving the controls on the autopilot control box and introducing command signals in proportion to the degree of attitude change he desires. Unlike pilot controlled flight, autopilot control is usually limited to changes in attitude of 30 degrees right and left roll and plus or minus ten degrees in pitch.

Heading control is accomplished in the low cost autopilots by using the Directional Gyro error signal as an additional error signal in roll, producing a roll trim change to return the airplane to the selected heading. This error signal is balanced out by the horizon gyro in the same manner as command errors. The result is that, if the airplane is purposely turned off heading by overriding the controls, it will come back to the selected heading smoothly, the angle of bank reducing smoothly to zero as the heading is approached. In the more sophisticated autopilots, such as used on airliners, the gyro is connected to the rudder through a separate amplifier and servo system with a cross connection to the roll circuit to produce good coordination. Obviously, any airplane using the low cost autopilots must be essentially an 'aileron' airplane if the performance is to be smooth and coordinated. Thanks to the excellent design of most of the business aircraft flying today, this is the case and makes the use of a two-axis autopilot a possibility.

(Continued on page 84)

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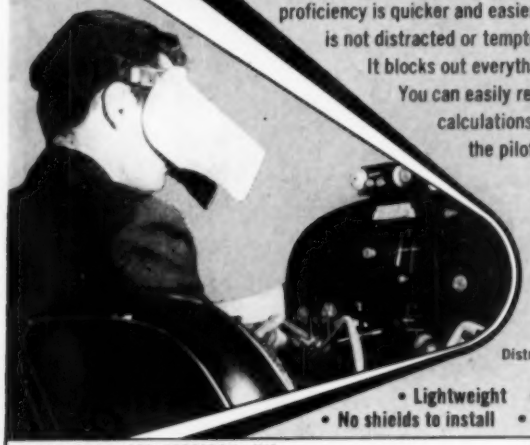

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(Continued from page 83)

The single-axis systems use a rate gyro as their primary sensing element. If 'rate gyro' is a new term to you, the best example is the turn and bank instrument in your airplane. A small gyro is restricted by springs that tend to hold it in a fixed position; however, a turning motion causes the gyro to precess and exert a force against the spring. The greater the turning rate the greater the force and the greater the indication or motion from the rest position. So, if your airplane is equipped with a single-axis system, any tendency to turn will result in a rudder (or aileron) movement to stop the turn. But since this type of system does not have a heading position reference, such as a directional gyro, it can only stop the turn but this may happen a few degrees away from the heading you were flying. It's a matter of sensitivity that determines how well these systems work and most of them are quite sensitive and incorporate a trim mechanism to prevent a tendency to turn a small amount in one direction. Usually these systems work better when the air is moderately rough for then they are able to average out the signals to produce a fairly good heading. Globe and Lear now have extra cost accessories that involve magnetic or gyro direction equipment to allow their single-axis systems to hold a heading as does a full autopilot.

In the Federal Autopilot, the rate gyro is used for directional control in lieu of a directional gyro, and is the only two axis autopilot for small aircraft that uses such a system.

The autopilots that will be discussed in the balance of this article are Tactair, Federal, Mitchell and Lear. Single axis system discussion is limited to Lear, Globe and Piper Autocontrol.

The autopilots are all different in the engineering and design approach so that comparison, technically, is difficult, even for someone who has had rather intimate contact over a considerable period of time. In the following analyses comparisons are made but only the obvious differences, advantages or disadvantages are mentioned The main idea is to increase your knowledge of the various equipments. Most of the information is as a result of inspecting the equipment and conducting a thorough flight test on each piece of equipment discussed. END OF PART I

The Hortons

(Continued from page 33)

ding uncut, polished semi-precious stones in the bulkheads.

In the specialized business of private aircraft interiors, owners sometimes have unusual requirements. For one corporation president's plane, the Hortons installed triple-wide seats. In another instance, an executive of short stature was given a special foot rest. Adjustable armrests were provided for an arthritic.

For O. J. McCullough, president of the McCullough Tool Company and an outstanding amateur chef, the Hortons equipped his Lodestar with special kitchen equipment, so that he might indulge in his hobby while in flight.

In their ten years designing and instal-

ling aircraft interiors, the Hortons have refurnished more than 1,000 planes—from DC-6 cargo carriers, Convairs, Fairchild F-27s, Gulfstreams, and even a tiny single-seat Mooney Mite, the smallest plane commercially produced in the United States. For Oklahoma's Aero Design and Engineering Company, the Hortons have designed and installed more than 600 twin-engine Aero Commander interiors.

Best known of these Horton-brightened Aero Commanders are those assigned to MATS' White House fleet. A typical Aero Commander "Gold Crest" interior, incidentally, usually takes about two weeks and costs around $3,200. However, this includes a magnetic checker board to while away the time between stops.

"We rely a great deal on color control to achieve appearances of greater length and width," says Bill.

Typical of the value of these restyling jobs was the case of an old and outmoded Lodestar, sent to the Hortons by a West Coast aircraft broker. His instructions were simple:

"Fix it up so I can sell it."

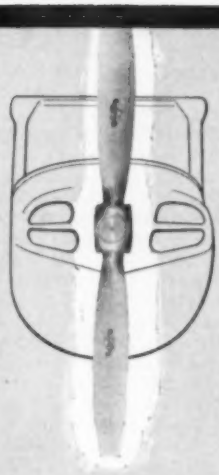
A couple of months later it rolled out of the Horton hangar. The cabin ceiling was covered in off-white plastic shot through with silver threads, the seats were covered in coral nylon with matching trim, the couch in white nylon, the bulkheads and sidewalls in charcoal, together with a coral carpet. Cabinet work throughout was Rift Oak Formica.

The curtains were Soji screening, with embedded butterflies and plant life. The master table had an altimeter, air speed indicator and chronometer, with instrument faces finished in off-white with charcoal numerals and coral hands. Rheostats controlled all the cabin lights.

Although the Horton design firm is relatively small, its clientele is world-wide and its customers' names read like pages from Who's Who and Dun and Bradstreet —Arthur Godfrey, Ambassador John Whitney, Westinghouse, Reynolds Metal, Kimberly Clark, the government of Laos, Syngman Rhee, President of Korea, the Shah of Iran, just to mention a few. In their decade of interior installing, the Hortons have serviced clients from Canada, England, Mexico, Brazil, Ecuador, Chile, Guatemala, Colombia, Korea, Laos, Australia, Yemen, Iran, France, Germany, and Switzerland, as well as from all over the United States.

The Hortons got into the aircraft design business more or less by accident. Bill was, for many years, one of Texas' best-known industrial and interior designers. Among other commissions, he decorated the famed Emerald Room at the Shamrock Hotel in Houston, as well as creating living quarters for tanker fleet ships and offshore oil well drilling barges. In the late 1940s, more or less to please himself, he created an interior for a Spartan Executive. Charles Scripps, of the newspaper chain, happened to see it, bought it from its owner on the spot. This quick sale, as much as anything else,

(Continued on page 86)



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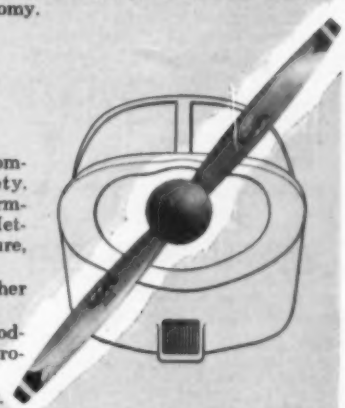

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(Continued from page 85)

convinced the Hortons that there was a real need for a company specializing in custom-built aircraft interiors.

Horton-Horton was formed, with its headquarters at Meacham Field, with ten original employees. The company now has 60 specialists on the payroll, refurbishes as many as ten aircraft a month.

Bill, an expert in business management and accounting as well as design, handles those aspects of the business. Dorthe Anne travels the globe as the firm's roaming salesman—saleswoman, that is.

In modifying an aircraft interior, which requires certification for airworthiness by the FAA, the Hortons never compromise with safety. All corners in sight are rounded. Even table-mounted instruments are countersunk. All ash trays are fire-safe, plunger types. Air ducts are padded with polyurethane foam.

Weight too is always kept in mind. For Bell's executive helicopters, as an example, newly-developed, lightweight sponge plastic underlay was placed beneath the carpets to give them a feeling of substance. For cabinet-work, honeycomb and hollow-construction materials, topped with formica, are now used.

"Often, too," reports Bill, "we remove wooden and metal side panels and replace them with stretched-in sidewalls backed up by flame-resistant canvas. Again, in the interest of weight saving, without sacrificing privacy, heavy doors between the cabin and cockpit are removed, to be replaced with double-faced, interlined, fire-resistant draperies."

The Hortons are quick to examine for possible use any new product coming on the market, from fabrics to coffee-makers, which will improve performance, heighten esthetic effect, increase efficiency. Faster-setting adhesives and specially skived leathers are among the latest products successfully incorporated into aircraft interiors, along with polyurethane as a replacement for heavier foam rubber underlays. For seat construction, a rubberized hog's hair, composed of swirled figure eights, is the latest thing.

In the future, Horton anticipates that seats, like couches, will face across the aisle, for better utilization in round-hulled planes such as Lockheed's JetStar. Seating pads will be made with the upholstery bonded to the cushions; inlaid, baked-in color will characterize window frames; and curtains will be of spun glass and synthetic asbestos, immune to fire or fading.

When not designing or selling aircraft interiors, the Hortons relax with their five children—two boys and three girls, ranging in age from one to 16 years—in a sprawling hilltop home just outside Fort Worth. Bill designed the house and furnishings himself.

Rarely today does Bill accept design commissions that do not involve aircraft. Two notable recent exceptions, though, have been a horse-drawn stage coach for a top executive of the American Liberty Oil Company, of Dallas, and the now-famous Bobby Jones electric golf cart which President Eisenhower uses to scoot about the golf links at Augusta. END

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Lockheed

(Continued from page 27)

decision fixed on a three-place tractor seaplane and his determination fixed to build it, he and his bride, Dorothy, went back to San Francisco where the head of the house again got a job as an auto mechanic.

Malcolm Loughead, who had remained in California, was soon as steamed up about the seaplane as was Allan. The boys persuaded a taxi executive named Mamlock to finance the overhead and they furnished the engineering tools, and knowhow. On June 15, 1913, the Model G, as they called it to infer that it was by no means the first of its line, was taken from the garage where it was built and flown from the foot of Laguna Street triumphantly out across San Francisco Bay.

Statistics show that the aircraft had a gross of 2,200 pounds, a useful load of 600, was 30 feet in length and had a wing span of 46 feet. It was the first ship to bear the family name and it was a roaring success. It hopped passengers at the Panama-Pacific exposition and spread the fame of its builders throughout the land. The boys cleared some $6,000 carrying visitors at $1 per minute. Thereafter the "G" was taken down to Santa Barbara and again put into sightseeing service. In fact, it stayed together until 1918 when the Lougheads dismantled it and sold the components. In retrospect I imagine the folks at modern Lockheed like to think of the ancient "G" as a harbinger of the ships to follow. It was an honest airplane, sturdy and responsive and, not an unimportant consideration in the aircraft industry, it made money for its operators!

Passenger hopping at Santa Barbara, however, had a very limited financial ceiling and the Lougheads could not feed all hands on that operation. They therefore in 1916 launched another venture. They persuaded a backer, organized a company and, most important of all, found a young man with something special on the ball—the most important thing any company finds. This young man, son of a Santa Barbara contractor, was a 21-year-old draftsman and automobile mechanic at the time the Lougheads hired him but he was to become one of the most noted aircraft designers in history. His name was John K. Northrop. Financier Berton R. Rodman was the angel of the company, the Loughead Aircraft Manufacturing Company, and Anthony Stadlman, a former associate of Allan's in Chicago, was made factory manager.

The aircraft upon which this group fixed its sights was to be a huge flying boat with twin engines, designated the F-1. World War I was raging in Europe and it had begun to seem inevitable that the United States would become involved. In such case there would be a market for seagoing aircraft.

Northrop designed the F-1 with a 75-foot upper panel wing span and a 47-foot lower wing span with pontoons at the tips. The ten-passenger aircraft grossed 7,300 pounds, and had a useful load of 3,100. Prophetically, it had a triple finned

(Continued on page 88)

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(Continued from page 87)

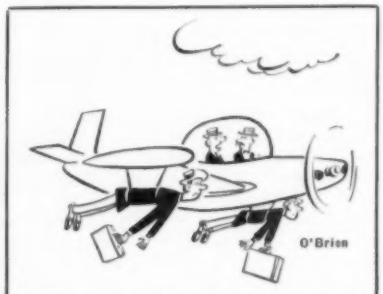
tail like the "Connie" of several decades later. And like the Connie, when it first took the air it was much the biggest and fastest aircraft of its category.

Navy was interested and in March, 1918, Allan set an over-water record in delivering the plane from Santa Barbara to North Island, San Diego, for testing. The F-1 proved to be all that was claimed for it but there was some hocus pocus about standardization of design and the Curtiss boat apparently was the standard. It is to be noted that government showed consistent early promise of the genius for confusion that has characterized its air affairs from the Wright Brothers onward. The company was put to work producing the Curtiss boats but by the time Northrop had made necessary unpaid-for alterations, the deal was a financial dud. The F-1 did salvage one bit of prestige. When the valiant King and Queen of Belgium visited the United States in the autumn of 1919, the State Department chartered the F-1 to fly their majesties on a tour of the Channel Islands. It is to be presumed that government provided the best and safest vehicle it could muster for the royal couple. And that was the Loughead F-1.

With termination of the war, there was an end to the idea of building military planes, but the Loughead group thought they might get somewhere with a sport plane. The S-1, with a monocoque fuselage, was a light biplane whose lower wing panel could be turned so as to form an air brake. Both wings folded to facilitate garage storage. The engine of 25 hp was a twin cylinder, water-cooled affair but it hiked the 400-pound empty weight S-1 along at some 75 mph. The plane represented a definite advance in design art and was certainly a grass roots dream but the postwar market was flooded with Jennies and Loughead didn't sell a single S-1 sport plane.

That was the end of the Loughead Aircraft Manufacturing Company of Santa Barbara. The group liquidated in 1921. Since the birth of the "G" in 1913, less than a half-dozen aircraft had borne the Loughead name but every one had been an advance over anything similar in its time.

The next epoch of Lockheed did not originate until five years later, 1926, but, to preserve the thread of continuity, a bit of explanation will suffice. Malcolm Loughead had worked on the idea of



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four-wheel hydraulic brakes for automobiles and in 1919 he had pulled out of aviation, organized the Lockheed Hydraulic Brake Company and moved to Detroit, hub of the automobile industry. (Incidentally, the company prospered and sold out to Bendix in 1932.)

Allan combined real estate selling in Los Angeles with representation of Malcolm's firm in the area. Northrop in 1923 went to work for Douglas and was in time to help design the "Cruisers" which Army Air Service used to circumnavigate the globe (April 6 to Sept. 28, 1924). Distance covered was 26,400 miles in 363 flying hours. Incidentally, one of the pilots on that project was Henry H. Ogden, now a Lockheed executive.

In 1926 Jack Northrop and Allan Loughead put their heads together on another aircraft design and another angel showed up to finance its manufacture—F. S. Keeler, a tile executive, who put up $25,000 for a controlling interest in the new corporation, the Lockheed Aircraft Company. Northrop took over as Chief Engineer and set up shop in a shed in Hollywood with Keeler as President, and old Air Corps pilot W. K. Jay as Treasurer, Allan Loughead as General Manager and once more Stadlman as factory superintendent.

The design which intrigued Keeler to the extent of putting up capital to back it was none less than the subsequently famed Vega. The first Vega produced was purchased by Hearst for entry in the Dole

(Continued on page 90)

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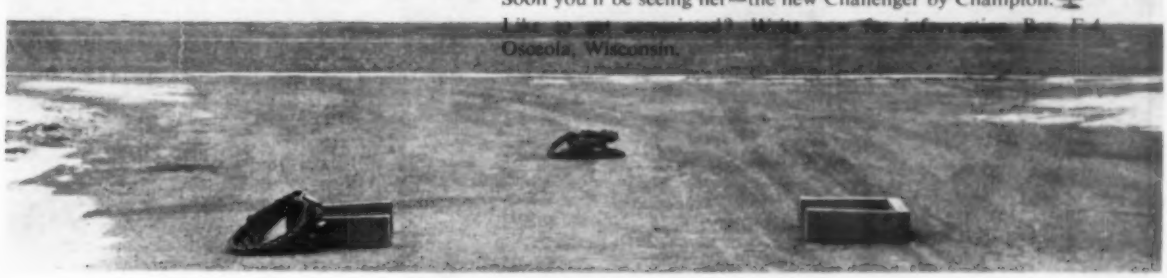

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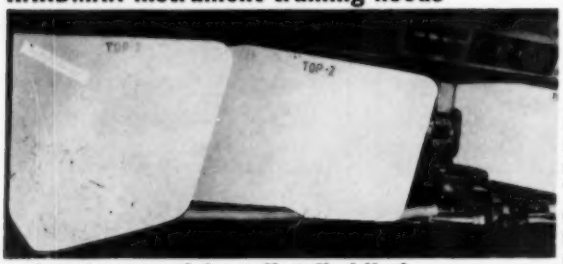

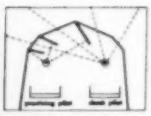

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(Continued from page 89)

race from California to Hawaii. Christened the Golden Eagle and flown by John Frost and Gordon Scott, the Vega was one of only several ships in the long overwater jaunt which stood much chance of getting there. But it disappeared without trace and none will ever know its fate. The whole idea of the race had been a mistake of over zealousness. Aircraft and aids of the time were not yet generally ready for such challenges.

However, over on the Atlantic side of the country, Lindbergh had made good on his New York to Paris venture and the market was psychologically opening up for sale of an advanced airplane. The Vega was it. Its high lift wing span of 41 feet and cantilever construction which minimized drag gave it great performance. Eddie Bellande was project test pilot. Hubert Wilkins and Ben Eielson purchased the second Vega and during 1928 bucked both the arctic and antarctic with it and a sister ship. They cruised from Alaska to Spitzbergen in some 20 hours and down in the antarctic made numerous exploratory sorties. Such was their admiration for their equipment that they named an antarctic mountain range for Lockheed and a cape for Northrop.

All of this publicity focused attention on the Lockheed Company and expansion became necessary. The company moved to Burbank, taking 20,000 feet of floor space in a building behind which there was room to construct a runway. The payroll now boasted some 50 employees and the local press said the number would quadruple if business kept advancing at current pace.

At this point Northrop left Lockheed to pursue studies in all-metal construction and flying wing design. Backed by Hearst, he formed the Avion Company, subsequently sold it to United Aircraft and a year later, in 1932, formed the Northrop Corporation, an engineering arrangement largely to serve Douglas. This venture was bought by Douglas in 1938 and in '39 Northrop founded Northrop Aircraft Corporation which he led until he retired in 1952.

Meanwhile the Vega continued to expand the airman's world. Gerald Vultee moved up to take Jack Northrop's place as Chief Engineer at Lockheed and Whitney Collins of Chicago came on to Burbank as treasurer. "It takes a Lockheed to beat a Lockheed" cried the jubilant public relations of the company. Western Air Express wanted a bigger, faster Vega and the "Air Express" emerged. The 220 hp Wright J5 was replaced by a P&W Wasp. The wing span was increased by several feet and lifted above the enlarged fuselage. A new cowling was designed. The "Express" cruised at 150 and packed a relatively larger load. Lockheed was in the air transport business.

But the factor that really kept the company name in the headlines was the activity of the breed of restless pilots who haunted the place. They had things to do and places to go. I hesitate to use names, yet how could one recall those Vega, Air Express, Sirius, Altair and Orion ships without thinking of Wiley

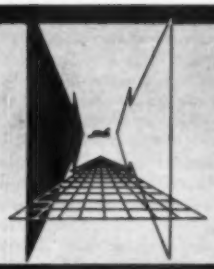
Post and Harold Gatty, Amelia Earhart, Art Goebels, Harry Tucker, Lee Schoenhair, Roscoe Turner, C. B. D. Collyer, Frank Hawks, Jimmie Doolittle, Vance Breese, Slim and Anne Lindbergh, Brock and Schlee, Ruth Nichols, Jimmie Mattern and Bennett Griffin, Howard Hughes, the intrepid Kingsford-Smith and so many more that memory seems to have an inexhaustible file of them like one of Tom Watson's mechanical brains. Those were the days! During 1928, Lockheed sold upward of a million dollars worth of airplanes. The scene looked ripe for the big wheels to move in and truly put aviation on the map.

Up in Detroit the machinery was set in motion—a holding company, the Detroit Aircraft Corporation, after the manner of the automotive combines, was formed. To gather various companies into one comprehensive whole had proved good strategy for the car makers. Why not for aviation? The country was booming. Capital was plentiful. So Detroit bought control of Lockheed and several other companies. Among the directors were some of the keenest financial minds in the country—Charles F. Kettering, Roy D. Chapin, R. E. Olds, as examples.

The great depression was soon to engulf the nation but the Lockheed Division of Detroit Aircraft Corporation was about as ready for it as any company could have been. Lockheed's big break was that Detroit had moved into management of the company a former executive of Eastman Aircraft, one of Detroit's other purchases, Carl B. Squier. (Allan Loughead had sold his stock and resigned when Detroit purchased control.) Squier, almost single-handed, kept Lockheed alive through the heartbreaking months and was on hand later, bloody but unbowed, to become a member of the team which eventually led Lockheed to an undreamed stature in American industry.

Someone is always asking me when I first knew one or another of my early confreres and I doubt if in a single instance I've ever been able to recall a specific meeting. And such is true of long friendship with Carl Squier. Perhaps it was during WW I or during the time he was barnstorming with Eddie Stinson following the war, or during his stint with the First Pursuit Group at Selfridge or in the old Michigan National Guard or perhaps even in the early days of the American Legion when pilots were vastly outnumbered and we had a rough time trying to sell airpower to the valiant but scornful ground sloggers and their ilk. In any case Carl and I are almost exactly of a vintage and it is impossible for me to write of him from any dispassionate viewpoint. His dogged faith in the idea that man was not born to be stuck in the mud; his selfless risk of everything he had to prove it; his unquenchable sense of humor even in the face of disaster and his shrewd insight into the motivating forces of his fellow men made him one of the most widely known and beloved executives ever to sell an aircraft. I don't know when I first met him but there'll never be a day I'll forget him.

(Continued on page 92)



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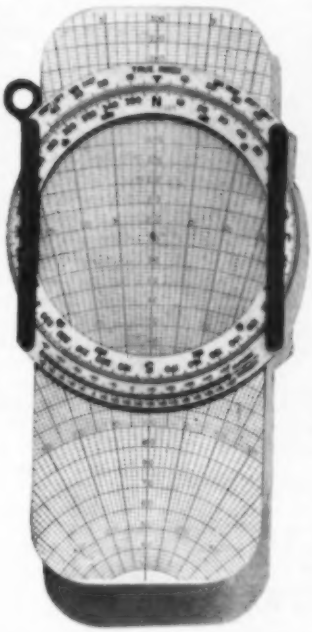

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(Continued from page 91)

The period between which he first went from Detroit to Burbank and finally saw the Detroit Aircraft Corporation fold its wings in economic acquiescence to fate was surely one of the most exciting if yet one of the most trying periods of his life.

Before Jack Northrop left Lockheed, he had designed for Wilkins a low wing aircraft named the Explorer but Sir Hubert ran short of funds and could not finance completion of the ship. Harold Bromley later did so with the idea of a trans-Pacific flight but cracked it up in a ground loop. Thereafter however Gerald Vultee sold Colonel Lindbergh on the design and built a similar aircraft for him; with Mrs. Lindbergh as co-pilot, the Colonel made several ambitious exploratory flights, one in 1931 from Washington, D. C. to Tokyo (north to the Orient) and another several years later from New York and return via Europe, Africa and South America (Listen—The Wind). As near as I recall, this Lindbergh plane, the Tingmissartoq, was the first of the Sirius line, a dozen or more of which were sold before Detroit went out of business. A second Sirius, "Justice For Hungary," carried two Hungarian pilots, Captains George Endres and Alex Magyar, from New York to Budapest in July '31. Squier, of course, was deeply involved in both the Lindbergh and Hungary projects and as well in the saga of the Post-Gatty circumnavigations of the globe. In 1931, Post's Vega "Winnie Mae" left Roosevelt Field, Long Island, on the 23rd of June and proceeding via the North Atlantic, eastern Europe, Russia, Siberia and Alaska, returned to New York less than nine days later. Subsequently, in July, 1933, the one-eyed Oklahoman, who previously had been a test pilot for Lockheed, repeated his round-the-world flight and this time the Winnie Mae clipped almost a full day from her previous effort. These experiences convinced Post that above-the-weather flying was essential to the stabilization of civil air transport and he conducted voluminous experiments with pressure paraphernalia. Wiley was the first pilot to look like a man from Mars. It always seemed to me an ironic twist of fate that such a superb pilot as Post should have been clipped so far off base in a compromised airplane and in a critical maneuver while accompanied by a friend he truly loved. Joe Crosson, who flew up to Point Barrow to bring Wiley and Will Rogers back after the crack-up, told me there was no answer for the tragedy except that "it was in the cards." I spoke at the New York memorial for the Oklahomans. The service was held at night after theatre closing time and all of show business was there without having had a chance to get out of costume or wipe off the paint. I've always thought of that evening where great and small were on a par in devotion to Rogers as one of the times that made me glad to belong to the human race. The airman's world had no greater friend than the cowboy philosopher. He would sit in the sun with us outside the hangar at Newark and provide a million dollars worth of fun for no more audience than a couple

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of greasy faced mechanics and an odd pilot or so.

That's another story—but I was led off the track by thinking to bring out the fact that Squier, in his role of manager at Burbank, was constantly in contact with as rare a bunch of human beings as modern times have produced. I had not much chance to get my hands on Lockheeds in those days but sometimes the luck broke right. Russ Thaw had a white Sirius and Marjorie Durant had a white Vega. Amelia had a red one. Jim Doolittle had a Shell ship that was a half-breed—a Vega fuselage and an Orion wing. One time Werner Newhouse, later an airline Captain and CAA inspector, hitched a ride home from the Cleveland air races to Newark with Jim. They eventually landed at Norfolk after a bout with foul weather. Apparently the instrumentation was haywire. In any case Jim had to stay contact all the way across the hills. I asked Werner how he had enjoyed the ride. "Well," he said, "if the pilot hadn't been Doolittle and the airplane a Lockheed, I'd have jumped out and taken a chance on landing on a haystack long before we ever sat down at Norfolk!"

Of the aircraft built at Burbank, the greatest number were Vegas (140), but probably the greatest ship of all was the Orion. A six-place plane, it retracted its gear and could cruise at an honest 200 mph. Several domestic airlines—Varney Speed Lines, American, Trans-Continental and Western, all ordered the Orion and, if memory serves me, it was the first American aircraft in scheduled commerce in Europe, with Swiss Airlines.

Lockheed at this time, encouraged by the performance they had been able to attain, ventured a design for the military market—a fighter, designated the YP-24 by the Army Air Corps. Powered with a Curtiss Conquerer of 600 hp, the fighter, of which the Air Corps had ordered a dozen, lost its chance for fame when Detroit went into bankruptcy.

From the time Allan and Malcolm Loughead had built the Model "G" until the receiver in bankruptcy declared Detroit's assets as $129,961, a little less than 200 aircraft had been sold under the Lockheed name but they represented a contribution to the state of the art far beyond their economic worth. The wooden ships named after the heavenly bodies, Vega, Sirius, Altair, Orion, were worthy predecessors of the Constellation . . . and in the ultimate of the Polaris! The stage had been set in the matter of basic experience for the next epoch of Lockheed's contribution to the free world. Almost everyone connected with the pioneering ventures had gone on to make his mark—the Lougheads, Northrop, Vultee, and a host of pilots and patrons who flew or owned Lockheed aircraft.

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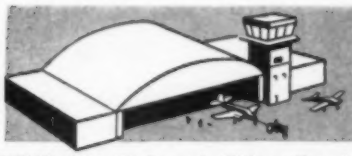

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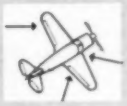

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Briefings . . .

(Continued from page 14)

shaft relative to TDC, which are automatically registered on an adjustable calibrated scale. An all-in-one tool, Time-Rite is available in kit for field or shop use. For complete details write Gabb, at Windsors Lock, Conn.

IN NATIONAL DISTRIBUTION is a new instrument training aid, the "APR Hood." A development of Aero Products Research, Inc., 339 N. Canon Drive, Beverly Hills, Calif., the hood permits student to use

his maps, approach charts and computer while maintaining instrument flight control. Made of high impact Styrene, it is lightweight, unbreakable and heat resistant. Price is $9.95.

FOUNDED LESS THAN A YEAR AGO, Mississippi Valley Helicopters, Inc., St. Louis, is a recently approved Bell Helicopter service facility. Located at St. Louis Lambert Field, the company currently operates three Bell 'copters and has flown more than 5,000 passengers on heli-taxi flights and charter work. A fourth Bell, the new 47J-2 Ranger, is soon to be delivered. Maintenance supervisor is Robert O. Spooner, a graduate of the Bell Helicopter Maintenance School.

NATIONAL AIR RALLY, an air show of sport aviation, will be held for the first time over Labor Day week end, September 3 through 5, at Orange Airport, Orange, Mass. Program will include midget plane racing, precision parachute jumping, soaring demonstrations, model plane contests as well as static and flight demonstrations in aircraft owned by members of the Experimental Aircraft and Antique Aircraft Associations.

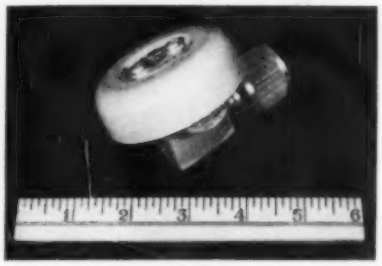
IN WICHITA, KAN., a unique flight training program is under way through the joint efforts of the Wichita Country Club and Yingling Aircraft, Inc., a local Cessna dealer. In classroom facilities provided by the club, Yingling's director of flight training Paul Sanderson is conducting an 18-week ground school course covering meteorology, navigation, use of computers and FAA regulations required for a private license. Half the members enrolled hold private certificates already and attend the classes to brush up and several operate their own aircraft for business and pleasure. A unique feature of the training is Sanderson's own audio-visual presentation in which a tape recorder and camera are used.

IN VOR locations where low-flying aircraft have been troubled with "dead spots," FAA is installing a new type airways radio station designed primarily to give an added safety factor to general utility and non-tactical military aircraft pilots who frequently operate at such levels. Known as a Limited Remote Control Outlet, it strengthens the voice signals transmitted in flight and puts the pilot in immediate contact with the nearest ATC station. This new facility now permits pilots to file flight plans, get weather information or send emergency messages from the lower as well as the higher altitudes.

THE WORLD SOARING Championship will be held this year at the Butzweiler Airport in Cologne, Germany, from June 4 through the 19. Representing the U. S. will be Richard Johnson of Arlington, Tex.; U. S. National Soaring Champion, Paul Bikle of Lancaster, Calif. and Richard Schreder, Toledo, Ohio. Captain of the team is Paul A. Schweizer, Elmira, N. Y. Alex Dawydoff, FLYING's Managing Editor, is Press Relations representative for the U. S. team.

FROM REMMERT-WERNER in St. Louis, Mo., Deere & Company, manufacturer of farm and industrial machinery, has taken delivery of a newly reconstructed DC-3 for corporate transportation. To be based at company headquarters in Moline, Ill., Deere's executive DC-3 is designed for 16 passengers, with work tables, adjustable desks, office equipment, and galley. Its radio and electronic equipment and safety features include the most advanced available, including a Collins #P101 radar and AP101 Automatic pilot. Tom Roche is chief pilot for Deere which also operates a light twin-engine aircraft.

FOR COMPRESSED GAS systems, protective breathing equipment and pneumatic systems where an audible alarm is an additional safety item, Scott Aviation Corp., 224 Erie St., Lancaster, N. Y., is offering a compact device which rings

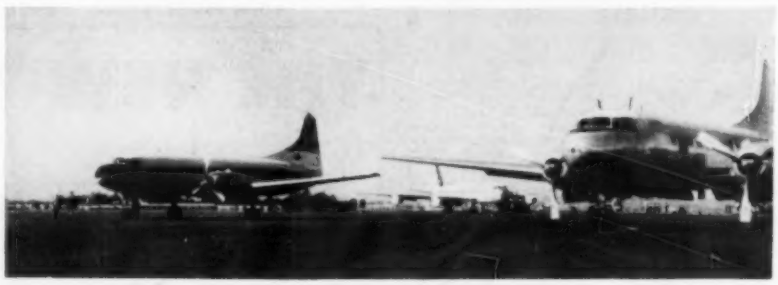


a vigorous bell when the pressure falls below a pre-set level such as 400 psi. The bell continues to ring until gas supply is exhausted or pressure is increased above the alarm pressure.

H. B. WETHERELL, director of the Connecticut Department of Aeronautics heads slate of 1960 officers of the National Assoc. of State Aviation Officials. Also elected were 1st v.p., Clyde Barnett, California; 2nd v.p., Richard L. Cunningham, Indiana; treasurer, Dale MacIver, Minnesota; and, re-elected as executive director, A. M. McMullen.

TOURIST OR TRAVELING executive, pilot or non-pilot, visiting Denmark and interested in doing some lightplane sight-seeing on his own will be welcomed by Scandinavian Rent-a-Plane Service in Copenhagen. SRAP offers choice of a Cessna 175, 172 or 150—with or without a company pilot—and pickup service throughout Europe. Tours, partly by plane and partly by car, may also be arranged. Cable "Airsystem" or write 47 Nyropsgade St.

WORLD AIRLINES marked up a new record in 1959 in transporting a total of 95 million globe-traveling passengers. The total in 1958 was around 87 million. The International Air Transport Association, which keeps score on such trends, estimates that 1960 will be even bigger; that the total over the North Atlantic alone should reach two million.



REUNION AT LINDBERGH FIELD, SAN DIEGO, Calif., found this prototype Convair 240 (left) lined up with the last of the piston-powered Convair-liner series, a Metropolitan 440, and, (background), a new jet-powered Convair 880. The 240, a veteran of 12 years' service is like new, having recently been converted to an executive aircraft for the Garrett Corp., of Los Angeles, by its own AiResearch Division which, to date, has modified nearly 100 of the series to meet operational requirements. Since 1947 1,075 of these aircraft were produced by Convair.

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